Metals Review

THE NEWS DIGEST MAGAZINE

Volume XXV - No. 2 February, 1952

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NATIONAL METAL CONGRESS & EXPOSITION

Convention Halls, Philadelphia • October 20-24, 1952

Competition for Students at the 1952 ASM Metallographic Exhibit

THE DETAILS ► Undergraduates can now compete on an equal basis at the metallographic exhibit held each year at the National Metal Congress and Exposition without limitations as to subject matter or techniques. Separate panels will be erected for adequate display of their best work. It is not necessary that the Entry show anything novel in microstructure or techniques; Excellence of student performance in the school's laboratory will be judged by the same jury which appraises the work of professionals. Prizes will be awarded as follows:

First Prize—Bronze Medal and $25 cash.
Honorable Mentions—Ribbon and $10 cash.

THE RULES ► Entrants are restricted to undergraduate students of academic institutions. ¶No more than two entries will be accepted from a single student. ¶Work must be done during the current academic year. ¶ Entries must be mounted separately on stiff cardboard. ¶ Each mount must contain pertinent information regarding subject, etchant, magnification, and special techniques (if any). ¶ Maximum size of mount, 14 x 18 in. ¶ Entrant must sign mount and give name of institution, course being studied, and year of graduation. ¶ Mount must be signed by department head, as evidence that the above conditions are met.

Send Entries (BEFORE SEPTEMBER 1, 1952) to

METALLOGRAPHIC EXHIBIT—***Student Division***

7301 Euclid Avenue • Cleveland 3, Ohio

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VOLUME XXV, No. 2 FEBRUARY, 1952

Published monthly by the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio; John Chipman, President, Ralph L. Wilson, Vice-President: William H. Eisenman, Secretary; R. L. Dowdell, Treasurer; J. B. Johnson, George A. Roberts, James B. Austin, James T. MacKenzie, Trustees; Walter E. Jominy, Past President. Subscriptions $5.00 per year ($6.00 foreign). Single copies $1.00. Entered as Second Class Matter, July 26, 1930, at the Post Office at Cleveland, Ohio, under the Act of March 3, 1879.

Claims for missing numbers will not be allowed if received more than 60 days from date of issue. No claims allowed from subscribers in Central Europe, Asia or the Pacific islands other than Hawaii, or because of failure to notify the circulation department of a change of address or because copy is "missing from files".

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Corridor Conferences Mark Midwinter Meeting

This Group Near the Registration Desk at the A.S.M. Midwinter Meeting in Pittsburgh Is Typical of the Informal but Earnest Discussions That Supplemented the Technical Sessions and Prepared Papers

"What am I doing so far from home? I came down here to learn about titanium. We're working with it now, you know."

"Our laboratory has some tests under way on a new jet engine alloy that indicate. . . ."

"We added a little boron, and using this induction unit. . . . ."

"I understand they're doing some interesting work on deoxidation over there. Bill was telling me. . . ."

"We're getting really phenomenal results with this method. Where speeds used to be 660 ft. per min. with this particular tool, we've got it up to 1200 now."

"There was one point in that last paper I couldn't quite go along with. Don't you think that last curve. . . ."

Such snatches of corridor talk overheard on the 17th floor of the Wm. Penn Hotel in Pittsburgh on Jan. 31 and Feb. 1 constituted one of the most important aspects of the A.S.M. Midwinter Meeting.

The five technical sessions drew together nearly 500 metallurgists, scientists and engineers vitally interested in getting the inside dope on the latest developments in their profession. A top-flight subject, "Titanium and Titanium Alloys", opened the program for an enthusiastic group that overflowed the meeting-room on Thursday morning. Topics for succeeding sessions on Thursday afternoon and evening and Friday morning and afternoon were "Embrittlement", "High Temperatures and Oxidation", "Nonferrous Alloys" and "Transformation and Grain Growth".

Between these formal papers and meetings, some of the crowds dispersed into little knots of conversation in the spacious corridors and parlors that adjoined the headquarters and registration desk. Old friends took up where they had left off at the last A.S.M. meeting, and new contacts were developed. Paced much more leisurely than the fast-moving, many faceted National Metal Congress, the Midwinter Meeting provided an invaluable opportunity for such intimate, face-to-face conferences between those with mutual problems and interests.

With the scene laid in one of the country's most concentrated centers of the metallurgical industry, the meeting drew visitors from such distant points as California, Chicago, New York, Alabama, Cleveland, Philadelphia, Boston, Detroit and other focal points.

All of the members of the A.S.M. Board of Trustees were present and held a regular meeting on Wednesday, Jan. 30. Meetings of various committees and subgroups were also scheduled, including the A.S.M. Committee on Vocational Education.

All of the papers presented at this meeting will be published in the 1952 volume of the *Transactions,* now going to press. Purpose of this first A.S.M. Midwinter meeting in about 20 years is to provide an opportunity for personal presentation of papers accepted for *Transactions* by the Publications Committee. The number of such papers has increased in recent years to a point where the technical sessions at the regular fall convention were becoming overloaded. Such a situation led to publication of papers without personal presentation, thus losing the benefits of discussion, both written and oral. It is anticipated that the Midwinter Meeting will become an annual event, and thus provide a rostrum so that all technical papers can be discussed in public.

A.S.M. National President John Chipman announced that the next winter meeting will be the Western Metal Congress, to be held in Los Angeles the week of March 23 to 27. 1953.

Machinability Still Cut-and-Try

Reported by A. D. Carvin

Joslyn Mfg. & Supply Co.

A talk on "Machining of Metals" featured the Oct. 8th dinner meeting of the Fort Wayne Chapter A.S.M. The speaker, E. A. Hoffman, manager of metallurgical sales for the LaSalle Steel Co., presented a condensation of a series of five lectures presented last year as part of the educational program of the Chicago Chapter.

Mr. Hoffman discussed the three types of chips that are formed in different machining operations and the six basic properties that determine machinability. It is still pretty much a cut-and-try proposition to determine the maximum machinability of an operation, he pointed out. However, there is ever-increasing research, and Mr. Hoffman hopes someday to see a general equation that can be used to determine maximum machinability.

Die-Casting Award Entries Open

Nominations or entries for the annual Doehler Award sponsored by the American Die Casting Institute are now being solicited. Nominations will be received between Jan. 1 and April 30.

The award is made for outstanding contributions to the advancement of the die-casting industry or to the art of die casting, as represented by technical achievement, advancements in plant operations, or other activities in this field. Any individual, group of individuals, technical or scientific society or committee is eligible for the award, which consists of a suitable plaque and a cash honorarium of at least $500.

Entries should be addressed to Award Committee, American Die Casting Institute, 366 Madison Ave., New York 17, N. Y.

British Advances in Jet Engine Alloys Outlined in Detroit

Reported by C. A. Gorton
Hoskins Mfg. Co.

British metallurgical advances in jet engine alloys were described before the Detroit Chapter A.S.M. on Nov. 12 by H. W. G. Hignett, superintendent, nickel research laboratory, Mond Nickel Co., Birmingham, England.

The components of British jet engines that have received the greatest amount of attention from metallurgical engineers, according to Mr. Hignett, are the combustion chamber, stator blades, turbine disks and turbine blades. Mr. Hignett outlined the difficulties encountered with these parts in service and told of the advances made in overcoming these difficulties by means of better alloys and improvements in design.

The trouble most generally experienced with combustion chambers is intergranular oxidation and cracking at the secondary air inlet holes. Mr. Hignett considers thermal shock to be the most important factor contributing to such failures. Combined with thermal shock are complex fatigue, creep and corrosion.

Longer life is being obtained by improved design to give a more uniform temperature distribution throughout the chamber. Inconel and Nimonic are typical materials used for combustion chambers. A laboratory test to study thermal shock consists of alternate rapid heating and cooling of small sheets that are similar in design to the actual combustion chamber. A reasonably good correlation has been found between such tests and actual performance.

Successful operation of stator blades requires materials with high creep strength, good resistance to corrosion and to thermal shock. These requirements have been met quite successfully with austenite steels such as 23% Cr, 12% Ni, 3% W, and 0.2% C. Additions of titanium and aluminum are generally made to improve creep strength. Cast blades generally have better resistance to thermal shock than wrought forms.

Successful performance of alloys as turbine disks depends largely on their creep strength and forgeability. To conserve strategic metals the British have changed from austenitic to ferritic alloy steels for turbine disks.

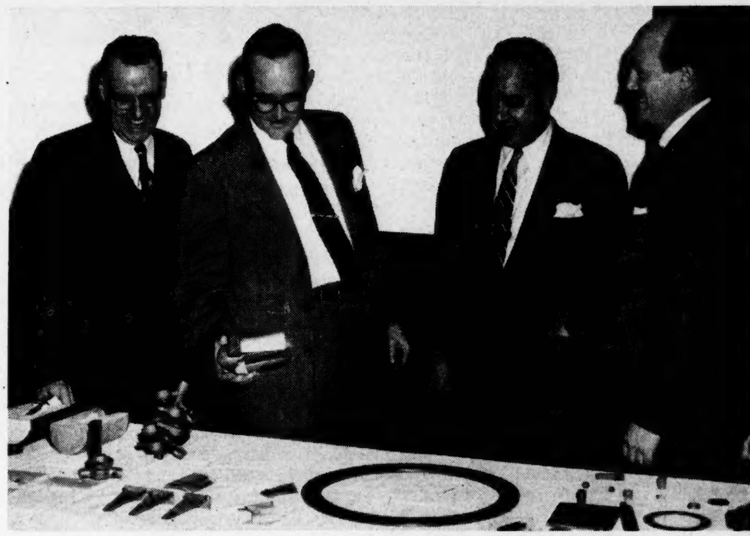
To meet creep strength requirements with ferritic alloys, small additions of molybdenum and vanadium are beneficial. Highest creep strength is obtained by adopting a heat treatment that will give a microstructure having small carbides well distributed throughout the ferrite.

For turbine blades, creep strength is also the most important property to be considered. Other factors are resistance to oxidation and intergranular corrosion, fatigue strength at elevated temperatures, and reproducibility of these characteristics from lot to lot.

These factors have been successfully met with various nickel-chromium (Nimonic) alloys. Production of these alloys is carefully controlled by spectrographic analysis of each lot of raw materials, strict adherence to a specified melting practice and an acceptance creep test on each heat.

Turbine blades are heat treated to obtain a large grain size for improved creep and fatigue strength. Care is also exercised to remove the surface layer of fine-grained metal resulting from cold working and heat treating.

Cast Vs. Powder Parts Compared



Relative Merits of Precision Cast Versus Powder Metal Parts Are Assessed by Boston Chairman Dow Robinson, Prof. Howard Taylor (Who Argued the Case for Precision Castings), John Wulff (Who Cited the Advantages of Powder Metallurgy), and Prof. Morris Cohen. (Photo by H. L. Phillips)

Reported by John L. Morosini
D. A. Stuart Oil Co., Ltd.

A panel discussion on the merits of "Powder Metallurgy Vs. Precision Casting" was presented to a group of 150 members and guests by John Wulff, professor of metallurgy at M.I.T., in charge of the metal processing division, and Howard F. Taylor, associate professor of metallurgy, M.I.T., in charge of the foundry laboratory. These two learned gentlemen presented the pros and cons in this unique field of metal processing before the Boston Chapter A.S.M. on Jan. 4.

According to Professor Wulff, powder metallurgy is desirable where a large number of comparatively simple parts is required. It offers the advantages of fast production, saving in machining time or cost, and good wear properties with included lubricants.

Precision casting, Professor Taylor said, should be used for parts that are intricate and complex in shape. Initial cost is low as compared to the high cost of dies in powder metallurgy. The castings also have higher strength.

The lecture was followed by a question and answer period and an exhibit of many sample parts made by each process.

The coffee speaker, R. Chaffee, vice-president in charge of engineering at the United-Carr Fastener Corp., showed color pictures of his recent trip through Guatemala.

Sid Baylor, chairman of the Educational Course, reported that on Dec. 21 the first educational lecture was held at M.I.T., with more than 140 guests in attendance. O. E. Cullen, chief metallurgist of Surface Combustion Corp., spoke on "Furnace Atmospheres".

Fellowships Announced

The 19th annual program of Tau Beta Pi fellowships for graduate study in engineering during the school year 1952-53 has been announced. All Tau Beta Pi members are eligible. Each award is in cash in the amount of $1200, payable in ten monthly installments.

Applications must be mailed by Feb. 29, 1952. Complete details may be obtained from Paul H. Robbins, Director of Fellowships, Tau Beta Pi, 1121 Fifteenth St., N.W., Washington 5, D. C.

Shows How to Overcome Limitations of Various Nondestructive Methods

Reported by D. D. Whyte
University of California

"Radiography and Its Relation to Other Laboratory Methods" was the topic presented by James V. Rigbey, metallurgical laboratory supervisor, Ford Motor Co. of Canada Ltd., before a joint meeting of the Los Alamos Chapter A.S.M. and the Society for Non-Destructive Testing.

Two principal things that one should know about his inspection equipment, Mr. Rigbey informed the gathering, are what it can do and what it cannot. Since the limitations of inspection methods are most likely to be underrated, he stressed methods of overcoming them.

X-rays constituted one of the first methods of nondestructive testing. Limitations are:

1. Thickness range—an economic problem, since the thickness that can be radiographed in one exposure largely determines the number of shots necessary.
2. Flaw location (depth of the crack below the surface): An X-ray film shows a picture in only two dimensions; this limitation can be overcome by use of stereo exposures.
3. Scatter—lessened by using a double diaphragm collimator type of cone.
4. Penetration (upper limit for carbon steel about 1¼ in.): Increases in penetrating power are offset by higher cost of equipment.

For gamma radiography three sources are currently in use: (*a*) radium (penetration, 1¼ to 4 in. of steel), (*b*) cobalt$_{-60}$ (¾ to 6 in.), (*c*) iridium$_{-192}$ (¼ to 2 in.). As an isotope source of radiation, chief advantages of cobalt$_{-60}$ lie in its higher specific acivity and its cheapness. The disadvantage is that the exposure time must be recalculated every six months because of its short half-life.

Fluoroscopy is useful for some of the lighter alloys as a first test.

To detect cracks crossing the X-ray and gamma beams at wide angles, a magnetic particle inspection method may be used. Two limitations are:

1. Direction of flaws must cross lines of magnetic force—corrected by using a "swinging" field.
2. Leakage fields are not all produced by flaws.

For nonmagnetic materials, penetrants such as Zyglo or dyes are used. Only surface cracks are located and these may be masked by foreign material. The use of statically charged particles may increase sensitivity.

For nonmagnetic, porous material the filtered particle method is best.

An inspection method utilizing supersonics must be provided for determining a thin flaw in the center of a large part. Penetrating power by supersonics is approximately 30 in. of steel or aluminum. The method is nonsensitive to flaws in the first half-inch of material, and the part must have one smooth surface.

Each method of testing and inspection performs some particular job better than any other, Mr. Rigbey said in conclusion. One must be able to correlate all methods and have an understanding of how they fit together in the jigsaw puzzle of producing a part cheaply and efficiently.

Science Foundation Issues Guide for Research Grants

The National Science Foundation of Washington, D.C., has announced a program of support for basic research in various physical and engineering sciences. The Foundation has earmarked approximately $1,500,000 to make grants for such research to educational, industrial, governmental or other institutions or individuals. Ordinarily, grants will be awarded to institutions for research by specified individuals.

A tentative guide has been issued by the Foundation to assist scientific research investigators in the preparation of proposals for such research grants. Copies of the guide will be distributed widely to universities and colleges, laboratories, and other organizations in a position to carry on competent scientific research. Requests for the guide should be directed to National Science Foundation, 2144 California St., N.W., Washington 25, D.C.

Applications are also being received for National Science Foundation graduate fellowships for the academic year 1952-53. The Foundation expects to award about 400 such fellowships. Application forms may be requested from the Fellowship Office, National Research Council, Washington 25, D.C.

New French Process Extrudes Stainless

J. J. Heger of U. S. Steel Co. (Center) Spoke on Processing, Fabrication and Selection of Stainless Steels Before the December Meeting of Texas Chapter. At left is H. C. Dill of Dickson Gun Co., chapter chairman; and at right M. W. Phair of Tennessee Coal, Iron, & Railroad Co., vice-chairman of the chapter. (Photo by Lee Dolan)

Reported by C. L. Horn
Metallurgist, Hughes Gun Co.

"Processing, Fabrication and Selection of Stainless Steels" was discussed by J. J. Heger, research associate of the U. S. Steel Co., at the December meeting of the Texas Chapter A.S.M.

Today stainless steels and other ferrous alloys are being extruded by a process developed by the French, Mr. Heger said. In this process glass is used successfully as a die lubricant.

Glass not only has good lubricating qualities but also is a good heat insulator. Die life is greatly increased and the dies are kept much cooler. The extruded products have a slight coating of glass which may be removed by quenching in water or by a pickling process.

The extra-low-carbon grades of stainless (0.03% C), formerly obtained only on special order, are now a standard product, Mr. Heger continued. These low-carbon grades are as resistant to intergranular corrosion as higher carbon grades containing titanium and columbium. Even lower carbon grades may be available in the future as a production item, according to the speaker.

Atmospheres for heat treating stainless steels were discussed. The A.S.M.E. method of arriving at the allowable working stress for 18-8 Type 304 stainless steel was illustrated by slides.

After the lecture Mr. Heger answered a number of interesting questions from the floor.

Ten Years Ago

Quotes From *Metals Review* February 1942

"Schenectady Chapter—The electron microscope as a new tool in metallography was introduced at the January meeting by David Harker of the General Electric Co. Research Laboratory. . . ."

Compliments

To ROBERT F. MEHL, director of the Metals Research Laboratory and head of the department of metallurgical engineering at Carnegie Institute of Technology, on his appointment as head of a commission of the Technical Cooperative Administration (the Point Four program) under the auspices of the Department of State. Dr. Mehl spent the month of January in Brazil, studying the possibilities of the development of the iron and steel industry and the profession of metallurgy.

♦ ♦ ♦

To J. O. ALMEN, research consultant, General Motors Research Laboratories, on the testimonial dinner given by the Shot Peening Division of the S.A.E. Iron and Steel Technical Committee, honoring his pioneering work in shot peening and his efforts in founding the division and service as chairman for its first seven years.

♦ ♦ ♦

To HARRY Y. MCCOOL, who retired in 1947 from Timken Steel & Tube Division, where he was superintendent of maintenance, on his appointment as service director for the city of Canton, Ohio.

♦ ♦ ♦

To JAMES R. THOMPSON, who retired on Nov. 30 as manager of the metallurgical department for American Steel & Wire Co., Cleveland, on his completion of a half-century of service with this U. S. Steel subsidiary.

♦ ♦ ♦

To R. C. MCMASTER of Battelle Memorial Institute on his selection to deliver the 26th Edgar Marburg Lecture of the American Society for Testing Materials next June on the subject of nondestructive testing.

♦ ♦ ♦

To NORMAN L. MOCHEL, manager of metallurgical engineering, Westinghouse Electric Corp., Philadelphia, on his selection to deliver the first H. W. Gillett Memorial Lecture of the A. S. T. M. Mr. Mochel will speak on "Man, Metals and Power".

♦ ♦ ♦

To EDWARD S. CHRISTIANSEN, president of Christiansen Corp., Chicago, on his selection as "Light Metals Man of the Year" by *Modern Metals*.

♦ ♦ ♦

To WILLIAM E. RUDER on completion of more than 44 years of service with General Electric Research Laboratory. Mr. Ruder retired on Dec. 31 as manager of the laboratory's metallurgy research department. Mr. Ruder was a pioneer in encouraging the establishment of metallurgy as a science in its own right. His most important work has been concerned with magnetic materials and with the development of the "calorizing" process.

Titanium Combines Features of Aluminum And Stainless for Jet Engine Applications

Reported by C. Weston Russell
Chemist, Wyman-Gordon Co.

The story behind the search for a cheap method to make titanium alloys was related before the Worcester Chapter A.S.M. on Nov. 14 by T. W. Lippert, general manager of Titanium Metals Corp.

Titanium will not, Mr. Lippert said, replace either aluminum or stainless steel, nor will it have any significant influence on the growth curves of these metals. There's a good chance, however, that titanium will soon be more common than magnesium.

Titanium came into its own, according to the speaker, because the Air Force wants a better metal than aluminum in jet engines but does not want the weight penalties involved in using stainless steels. The same reasoning applies to air-frame structures in the new designs of both fighters and long-range bombers.

Aluminum is light enough for airplanes, but it can't withstand the intermediate temperatures developed in some parts of jet engines. Stainless steel can withstand the high temperatures, but engineers are reluctant to design in the added weight. Titanium appears to combine some of the best features of both aluminum and stainless steel, and, what is more, resists salt water corrosion and abrasives better than either of the other metals.

For titanium to be accepted commercially on a large scale, the price will of necessity have to drop to one-half or one-third present levels. With the Air Force's financial backing, the metal industry hopes that the price of titanium can be moved downward with reasonable speed—although perhaps not so spectacularly as in the history of aluminum.

The Navy is also interested in titanium because of its noncorrosive properties. Suggested marine uses are snorkel tubes for submarines, valve seats, heat exchangers, condenser piping systems, pump shafts, small propellers, propeller shafts, and steam turbine blades.

T. W. Lippert (Left), the Speaker, and J. Walter Gulliksen, Worcester Chapter Chairman, Examine a Bowl Made out of a Titanium Alloy

The big commercial drawback to widespread use stems from the difficulty in separating titanium from other elements. It is never found in anything approaching a pure state, and has a great affinity for such common elements as carbon, oxygen and nitrogen. Mr. Lippert outlined present methods for refining and fabricating the metal, and pointed out where future developments might lie.

Tocco Announces Contest

A $3000 "Economy in Production" contest has been announced by the Tocco Division of Ohio Crankshaft Co. The prizes will be awarded for illustrated articles of 250 words or more describing the use of Tocco induction heating for heat treating, brazing, soldering, forging or melting. Entries should deal with methods of increasing production and decreasing cost, and must describe actual installations of Tocco equipment.

Five prizes will be awarded ranging from $1000 to $100, with five additional awards of $50 each. Entries must be submitted before June 1. Entry blanks may be secured by addressing "1952 Economy in Production Contest," Tocco Division, Ohio Crankshaft Co., Cleveland 1.

Oak Ridge Invites Students Of Reactor Technology

Industrial organizations interested in obtaining special training in nuclear reactor technology for experienced engineers in their employ are invited to sponsor their enrollment in the 1952-53 session of the Oak Ridge School of Reactor Technology. The deadline for experienced engineer applicants is March 1, and the school term begins Sept. 8, 1952.

The school operates a twelve-month session open to two categories of engineering candidates. A limited number of recent college graduates are accepted in Category A in the status of student employees. Category B students are selected from the applications sponsored by Government agencies and private industrial firms interested in participating in the AEC nuclear energy program.

Further information and application forms may be obtained by writing to the Director, Oak Ridge School of Reactor Technology, P. O. Box P, Oak Ridge, Tenn.

Salvage Welding of Tools And Dies Will Help to Conserve Critical Alloys

Reported by Lacy M. Smith
Eastman Kodak Company

A timely report on the use of welding in tool and die repair and construction was given by L. D. Richardson of the Eutectic Welding Alloys Corp. at a joint meeting of the Rochester Chapters of A.S.M. and of the American Society of Tool Engineers on Nov. 5.

Our 90 billion dollar defense program is barely underway, and as it gains momentum, larger quantities of critical alloys will be required. Such critical alloys are molybdenum, cobalt, chromium, vanadium, and tungsten—all used in large quantities by tool and die manufacturers. At the present time all alloys are in short supply, tungsten being most critical —only enough for the usual peacetime requirements, Mr. Richardson pointed out.

Composite die construction, wherein tool and die steels are welded to low-cost carbon steel, reduces the amount of expensive highly alloyed steels required. This method often results in considerably lower fabricating costs as well.

Welding is not a cure-all for broken parts, the speaker noted. Where poor design has resulted in premature failure, repair-welded parts cannot be expected to perform satisfactorily. When parts become worn or where accidental damage occurs, repair welding can in many instances restore the part to its former usefulness.

The feasibility of repair welding is generally determined by the physical shape and size, small parts of simple shape being the easiest to repair. Several examples and welding procedures, as well as a welding demonstration, were given.

Mr. Richardson feels that the use of welding to reclaim broken or worn tools and dies is economically feasible in many instances, and that welding will be more extensively used as shortages become more acute.

Twenty Years Ago

Quotes From *Metals Review* February 1932

"The 1932 National Metal Congress and Exposition will be held in Buffalo, Oct. 3-7."

Boron-Treated Steels Are Welded as Readily as Standard A.I.S.I. Types

Reported by A. E. Leach
Metallurgical Engineer
Bell Aircraft Co.

Fabrication of boron-treated emergency steels by welding should be no more difficult than the steels for which they are substituted. Metal fabricators have not had much experience in using these new steels, and this interesting information was presented to the Buffalo Chapter A.S.M. by Clarence E. Jackson, research metallurgist for the Union Carbide and Carbon Research Laboratories, Inc.

Mr. Jackson's experience was with a heat of A.I.S.I. 4130 steel, half of which was poured with an addition of boron. No difference in welding characteristics could be found between the metal with boron and that without.

Isothermal transformation diagrams can be very useful in determining preheat and postheat temperatures and times to gain the maximum weld ductility. When using preheat only, weld ductility varies directly with preheat temperature. However, weld ductility will more than double if a postheat temperature is chosen to correspond to the nose of the TTT-diagram and the weldment is held at this temperature long enough for the isothermal transformation to be completed.

Therefore, preheating, combined with the above postheating cycle, will give a weld having the greatest possible ductility. It was emphasized that postheating must be done immediately after welding, without allowing the piece to cool to room temperature. Postheating temperature must be above the Ms point.

Charts illustrated how weld nugget size is related to electrode travel and welding current, and how the nugget size, in turn, controls the hardness of the heat-affected zone adjacent to the nugget. When fabricating by automatic welding, a careful choice of these variables will result in a more ductile weld.

At Philadelphia Officers' Night

George Roberts (Left), A.S.M. Trustee, Delivered the "State of the Society" Message Before Philadelphia Chapter's National Officers' Night. Center is J. Russell McCarron, chapter chairman, and at right, E. E. Thum, editor of Metal Progress, *who delivered the principal address of the evening*

Reported by
Charles W. Alexander, 3rd
Metallurgist, Henry Disston & Sons, Inc.

The traditional National Officers Night at the Philadelphia Chapter A.S.M. was held Nov. 30. A reception and buffet supper in honor of the national officers and past presidents preceded the meeting. Past Presidents Bradley Stoughton, Francis Foley and William Coleman were present.

In the absence of our old friend Bill Eisenman, George Roberts delivered Bill's usual "State of the Society and Down on the Farm" talk. Dr. Roberts is an A.S.M. national trustee and chief metallurgist for Vanadium Alloys Steel Co. He outlined some of the Society's plans and objectives for the coming years.

E. E. Thum, editor of *Metal Progress,* delivered the address of the evening. Mr. Thum traced the development of our present concept of "Nuclear Energy" and its use as a weapon of war as well as in peace.

Australian Metals Group Meets

The annual meeting of the Australian Institute of Metals will be held in Melbourne the week of April 28 to May 2. American A.S.M. members who may be in Australia during this period are cordially invited to attend the meeting, according to E. G. Love, federal secretary.

Visits of inspection to some of the leading industries in Melbourne will be included on the program. Further information may be secured by writing to Mr. Love at the Australian Institute of Metals, P. O. Box 1708 P, Melbourne, C.1, Australia.

Toolsteel Heat Treatments Classified

Raymond P. Kells (Left) and Stewart G. Fletcher (Right), Both of Latrobe Electric Steel Co., Presented a Program on "Selection and Heat Treatment of Toolsteels" at Toledo. In center are Robert Huebner, chapter chairman (at left), and John E. Preas, technical chairman

Reported by John E. Preas
District Manager, Latrobe Electric Steel Co.

Stewart G. Fletcher, chief metallurgist of Latrobe Electric Steel Co., presented a lecture entitled "Selection and Heat Treatment of Tool and Die Steels" to the Toledo Chapter A.S.M. on Nov. 8.

Dr. Fletcher classified the various types of toolsteels and high speed steels, and outlined their applications and typical heat treatments. He started with the carbon steels, which are considered the simplest of the toolsteels from an alloying and heat treating point of view. He then covered the fast finishing steels, the high speed steels used for cutting purposes, and the steels used for dies, both cold work and hot work.

Considerable emphasis was placed on the heat treatment of high speed and die steels. Modern types of heat treating equipment such as controlled atmosphere furnaces and salt baths are responsible for greatly improved characteristics in these materials.

One of the prime requisites for maximum tool or die life is high quality in the steel used. Manufacture of such high-quality materials was described, as well as some of the modern ultrasonic inspection procedures used to ferret out bars and forgings which may have internal defects.

Raymond P. Kells, chief service engineer, answered questions in an ensuing discussion period. A color film entitled "The Story of High Speed Tool and Die Steels" was shown.

Sierra Steel Expands Plant

On Nov. 9, Sierra Drawn Steel Corp. of Los Angeles held an open house to celebrate the completion of a 30% increase in plant area.

Fred J. Robbins, president of Sierra, and a past national trustee of A.S.M., said that the increased facilities would permit Sierra to give improved metallurgical and engineering service, production flexibility, and faster delivery. Sierra Drawn Steel is the only independently owned cold finishing bar mill in the West.

Field Trip Demonstrates Metallurgy as Applied In a Canadian Distillery

Reported by Walter J. Chappell
Vivian Engine Works, Ltd.

At 3:00 p.m. on Thursday, Nov. 9, members and guests of the British Columbia Chapter A.S.M. assembled in the office of the British Columbia Distillery Co, Ltd., in New Westminster. The group looked forward with anticipation to learning something about the application of metallurgy in this industry, learning how alcohol is made, and possibly sampling some of the finished product.

The members were promptly disillusioned on the last-mentioned possibility, but were amply compensated by a well-conducted and interesting plant tour.

The grain and malt storage bins were first shown, and the case hardened grinding wheels used for pulverizing these materials were inspected. Grain and malt are ground separately, and then conveyed to the top of the building where a predetermined portion is inserted in the "mash" tanks and cooked.

The next operation took place at the yeast tanks, where the yeast is cultured at a predetermined temperature and increased by the addition of air mechanically stirred in with specially shaped paddles.

Fermenting tanks are of 20,000 to 28,000 gal. capacity. Copper pipes are used to convey the mash to these tanks and yeast is added; fermentation takes place in the absence of air, and the carbon dioxide generated during this fermenting process keeps the solids in suspension and forms a "cake" on the surface which settles to the bottom when fermentation is complete.

This fermented liquid, together with the solids, is conveyed to the still, where the suspended solids are separated and the alcohol removed. The solids are dried for animal food, and the liquid is evaporated with a spray evaporator, which blows products of combustion from an oil furnace into a cyclone separator.

Some of the alcohol thus obtained is blended with blowing material and stored in wood casks to absorb the fusil oil and make whiskey. Another portion of this alcohol is separated from the fusil oil by treating and mixing with hot water which dissolves the alcohol. This solution is placed in a second still, which produces pure alcohol.

In the storeroom the group learned about the manufacture and use of different types of kegs for aging the whiskey. Finally, the blending and bottling plant was inspected.

The tour of the distillery was followed by a short visit to the Ray Adams Machine Works, also at New Westminster. Mr. Adams, a member of the chapter, explained the operation of his many machines and told how automobile engines are converted for marine use. Of particular interest was a water cooling assembly, which is attached outside the hull and requires only a hole in the boat's planking.

Los Angeles Presents Heat Treating Course

Reported by E. R. Stauffacher
Southern California Edison Co.

The first lecture in the educational course on "Principles of Heat Treatment of Metals" being conducted by the Los Angeles Chapter A.S.M. was held on Jan. 7, with 150 members and interested guests in attendance. From the advance registration, it is anticipated that probably 200 persons will be enrolled in the course.

M. A. Grossmann's A.S.M. book on "Principles of Heat Treatment" is being used as the textbook. Lecturers and subjects are as follows:

Jan. 7—Principles of Hardening (Part I), by James R. Cady, Professor of Metallurgical Engineering, University of Southern California.

Jan. 9—Principles of Hardening (Part II), by Edgar Brooker, Chief Metallurgist, U. S. Spring & Bumper Co.

Jan. 15—Transformation of Austenite, by Fred Arnold, Chief Process Engineer, Norris-Thermador Corp.

Jan. 17—Case Hardening and the Relation of Grain Size to Hardening, by Edward E. Fess, Metallurgical Consultant.

Jan. 22—Heat Treating Operations, by Wm. E. Twiss, General Manager, Twiss Heat Treating Co.

Hear Four Speakers on Abrasives

Leaders at the Dec. 12th Meeting of Worcester Chapter, When "New Trends in Abrasives" Were Discussed by Four Speakers, Were (Left to Right): Malcolm M. Maynes of Norton Co., One of the Speakers; J. Walter Gulliksen, Chapter Chairman; Harold B. Bell, Membership Committee Chairman, Who Introduced 16 New Members; William F. Winemiller of Norton Co., a Speaker; Lincoln G. Shaw, Secretary-Treasurer; Joseph L. Swensson of Behr-Manning Corp., a Speaker; W. Maxwell Wheildon, Jr., of Norton Co., Also a Speaker; and George W. Coleman, Technical Chairman

Reported by C. Weston Russell
Chemist, Wyman-Gordon Co.

Four speakers outlined "New Trends in Abrasives" at a meeting of the Worcester Chapter A.S.M. on Dec. 12. The subject matter was divided as follows: "Wear Resistant Materials", by W. Maxwell Wheildon, Jr., research engineer, Norton Co.; "Tumbling Abrasives", by Malcolm M. Maynes, sales engineer, abrasive division, Norton Co.; "High-Temperature Refractories", by William F. Winemiller, chief sales engineer, refractories division, Norton Co.; and "Abrasive Belts", by Joseph L. Swensson, New England divisional manager, Behr-Manning Corp.

During the afternoon preceding the meeting, the chapter members visited the Norton Co.'s new plant—the world's largest for the manufacture of grinding wheels. The plant was especially designed and constructed to house a radically improved process of grinding wheel manufacture. Ten million wheels have already been turned out.

Die Steel Heat Treatment Explained Graphically

Reported by Sydney Gamlen
Eastman Kodak Co.

An interesting discussion of the treatment and application of die steels was presented to the Rochester Chapter A.S.M. on Dec. 10. Guest lecturer was L. E. Gippert, metallurgical service engineer of the Allegheny Ludlum Steel Corp. Prior to the talk, Mr. Gippert showed an educational movie entitled "The Melting of Huron".

In the first half of his lecture, Mr. Gippert covered some of the factors to consider when heat treating toolsteels. His discussion centered about a graphic plot of values of distortion, magnetism and hardness versus draw temperature for a 5% chromium air hardening die steel. To account for the shape of the curves, a correlation with internal phase change was made.

Depending on the draw temperature, either expansion or contraction will occur when a toolsteel is tempered, Mr. Gippert explained. He also pointed out that other toolsteels exhibit curves of general shape similar to those for the 5% Cr air hardening steel. A low-temperature treatment will greatly flatten these curves.

In the second half of the lecture, a number of examples of toolsteel failures were shown and cures were suggested. Mr. Gippert feels that the chief causes for toolsteel failure are one or a combination of the following: heat treatment, improper grade, poor grinding, poor design, defective steel, or operational abuse. The last-named factor includes poor die alignment, double feed, insufficient support, and abuse.

Manpower Shortage Neglected

Reported by T. G. Thurston
Sales Engineer
Bryant Industrial Div., A.G.E., Inc.

"Much emphasis has been placed on the growing shortage in metals while the equally important shortage of trained technical manpower has been neglected." This was the opening theme of John Chipman, head of the department of metallurgy at M.I.T. and A.S.M. national president, addressing the Cleveland Chapter on Dec. 3. Dr. Chipman's talk on "Meeting the Country's Need for Metallurgists" is being presented before a number of local chapters during the current season, and will therefore not be reviewed in detail here.

The Chapter also played host to W. H. Eisenman, national secretary, who brought his audience up to date on the Society's activities and achievements in his usual entertaining manner.

Informal Group at Columbus

National and Chapter Officers Chatting Around a Table in Columbus Included Oscar E. Harder, Past National President; John Chipman, Current President and Principal Speaker at the Meeting; Ernie Christin, Chapter Secretary; Bill Eisenman, National Secretary; Bruce Gonser, Chapter Treasurer; Earl Bleakley, Chapter Vice-Chairman; and Joe Spretnak, Chairman

Reported by A. N. Eshman
Engineering Laboratory
North American Aviation, Inc.

Santa came to the Columbus Chapter early with the presence of National President John Chipman and Secretary Bill Eisenman at the meeting on Dec. 12.

Blackface humor was revived for the evening's after-dinner entertainment provided by the Battelle Minstrel Players.

As a preface to the technical session, Bill Eisenman genially related many interesting sidelights of the visit by foreign metallurgists during the National Metal Congress and World Metallurgical Congress.

Dr. Chipman's technical talk dealt with some aspects of the chemistry of steelmaking. Included were discussions of the solubilities of various elements in liquid steel and activities of sulphur and oxygen in the presence of other alloying elements.

Lime-Ferritic Electrodes Weld Steels Heretofore Considered Unweldable

Reported by R. C. Pocock
Chief Engineer
Engineering Research Laboratory
Bendix Products Division

A paper on "Lime-Coated Ferritic Electrodes" was presented on Dec. 12 before a joint meeting of the Notre Dame Chapter A.S.M. and the American Welding Society. The speaker was D. L. Mathias, research engineer, Arcrods Corp.

Low-hydrogen lime-coated ferritic electrodes have some definite advantages over older types commonly accepted, the speaker said. They provide a means to weld steels heretofore considered unweldable by metallic-arc welding. It takes time to train operators, but the electrodes give excellent performance, and live up to claims if properly used.

Welds can be deposited on high-sulphur steels, air hardning steels, and complex alloy steels. This type of rod can be used with both a.c. and d.c. set-ups. They consistently deposit high-quality welds under adverse conditions. There is no underbead cracking on air hardening steel to contend with, and these low-hydrogen rods offer freedom from reaction pitting and from flaking of enamel along the weld on enameled steel.

These rods tend to absorb moisture if stored in the open, unless a temperature of at least 225° F. is maintained. They are available in sealed containers and can be maintained indefinitely in a sufficiently dry condition to give satisfactory results. Restrained welds are susceptible to microfissuring if moisture is not held down; however, unrestrained welds are not so greatly affected.

Mr. Mathias mentioned current research developments in the direction of a ceramic bond to replace soluble silicate for the purpose of reducing moisture pick-up. Electrodes with this type of bond are not yet available on the market for general use.

The lime-ferritic electrode is not intended as a panacea for every welding problem, Mr. Mathias warned in closing. Nevertheless, its development is a step toward the ultimate objective: to produce an electrode capable of welding a variety of steels under highly diversified conditions.

Gillett Memorial Lecture Established by A.S.T.M.

Establishment of an annual H. W. Gillett Memorial Lecture has been announced by the American Society for Testing Materials in cooperation with Battelle Memorial Institute. The purpose of the lecture is to commemorate Horace W. Gillett, who was one of America's leading technologists, the first director of Battelle, and an active worker for many years in A.S.T.M., as well as many other technical societies including A.S.M. Dr. Gillett died in March 1950.

The memorial lecture will be delivered annually at a meeting of the A.S.T.M. The first will be given at the Society's 50th anniversary meeting in New York during the week of June 23, 1952. The lecturer will cover a subject pertaining to the development, testing, evaluation, and application of metals. Further provisions in the agreement between A.S.T.M. and Battelle Institute provide for an honorarium, and the publication and dissemination of the lecture.

Chipman Visits Mahoning Valley

Mahoning Valley Chapter Held National Officers' Night on Dec. 11. From left are Karl Fetters, assistant to the vice-president in charge of operations, Youngstown Sheet and Tube Co., technical chairman of the meeting; Robert P. Hill, electric furnace superintendent, Sharon Steel Corp., chapter vice-chairman; John Chipman, head of the department of metallurgy at M. I. T., A. S. M. president; Henry A. Holberson, assistant vice-president, Youngstown Metal Products Co., chapter chairman; and Eugene Woloshyn, process metallurgist, U. S. Steel Co., secretary-treasurer. Dr. Chipman presented the principal address on "Sulphur in Steelmaking". (Photo by Henry Holberson; Report by Eugene M. Smith)

THIRTY YEARS AGO

In the fall of 1921 JOHN A. MATHEWS,† president of Crucible Steel Co. of America, and ELWOOD HAYNES,† president of Haynes Stellite Co. and of the Haynes Automobile Co., were elected to honorary membership, according to an announcement in the *Transactions* of the American Society for Steel Treating.

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Transactions editorializes: "Probably Mr. Haynes is best known for his building of the first Haynes automobile [since consigned to oblivion], although he has won considerable prominence through his inventions of Stellite and stainless steel . . ."

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Two sectional meetings were announced for the winter and spring of 1922. A winter meeting was scheduled for February in New York, and a spring meeting in Pittsburgh during May. The purpose of the meetings was "to promote greater activity of the Society", particularly for those unable to attend the national meetings.

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The forerunner of A.S.M.'s eight-year-old "Review of Current Metal Literature" dates back 30 years to the announcement in the December 1921 *Transactions* that an abstracting service would be a new feature of the publication. "It is not the purpose," according to the announcement, "to review the subjects in any detail, but to give sufficient information that the busy reader may be advised of any articles in which he may be interested"—still essentially the purpose of the present literature review.

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Subdivisions of the abstracting service covered the subjects of Carbonizing, Effect of heat treatment on physical properties, Heat treating equipment and practice, Metallography and hardness theory, Some unusual steels, and Testing instruments.

Fleming Joins Morrison Eng.

T. F. Fleming has been appointed general manager of the Morrison Engineering Corp., Cleveland, according to announcement by Leonard Davis, president. In this capacity, he will head up the metallurgical department of the company.

Mr. Fleming was formerly supervisor of the heat treating department of National Screw & Mfg. Co. Last summer and fall he served as technical representative on the staff of the World Metallurgical Congress, sponsored by A.S.M. He was previously associated with Morrison Engineering Corp. during 1936-38.

† Now deceased.

248 Register for St. Louis Course on Machining

Personnel of the Key Co. Who Attended the St. Louis 1951 Educational Program. Many are holding A.S.M. certificates of 100% attendance

Reported by G. A. Fisher, Jr.
International Nickel Co., Inc.

A series of five lectures and discussion periods on "Machining of Metals" constituted the fall educational program for the St. Louis Chapter A.S.M. The course was conducted by five outstanding men in the subject field, and the textbook "Machining—Theory and Practice" was used.

An enrollment fee was charged for the course, amounting to $5.00 for members and $7.50 for nonmembers. This fee included the cost of the textbook. It resulted in a small cash balance at the completion of the course, which by action of the Executive Committee, was set up as a separate "Educational Fund", to be used only for preparation and conduction of the educational programs of the St. Louis Chapter.

A total registration of 248 students heard the first lecture on Oct. 1. "Basic Principles of Metal Cutting" were presented by M. E. Merchant, assistant director of research, Cincinnati Milling Machine Co. Dr. Merchant explained the fundamentals of machining or cutting of metals on a physical and mechanical basis. His lecture was general in nature but specific in both theory and practice.

The second lecture, on Oct. 8, was by K. J. Trigger, professor of mechanical engineering, University of Illinois. Speaking on "Heat in Metal Cutting", Professor Trigger explained the effects of heat on the workpiece as well as upon the tool, and also upon cutting conditions. His lecture also covered the effects of tool and workpiece upon the generation of heat.

An "Evaluation of Machinability" was given by E. A. Hoffman, manager of metallurgical sales, LaSalle Steel Co., on Oct. 22. Covering one phase of his lecture series on machinability given before the Chicago Chapter last fall, Mr. Hoffman discussed methods for determining and rating the machinability of metals.

J. W. Sands, head of engineering steels section, development and research division, International Nickel Co., was the speaker on Oct. 29. His lecture on "Relation of Structure to Machinability of Metals" contained a wealth of fundamental information. He showed that the machinability of a material is not entirely dependent upon the hardness, but is more closely related to microstructure. Influence of the hard constituents or inclusions such as alumina, silica or carbides on the machinability of the workpiece was pointed out.

The course was concluded on Nov. 5 with a discussion of "Economics of Machining" by A. O. Schmidt, research engineer, Kearney & Trecker Corp. Economics, he said, are related to the type of tools used and the type of work to be accomplished. His lecture included data on the machining or removal of metal by grinding.

Many favorable comments were received concerning the subject of this year's educational program, and particularly the excellence of the presentations by the lecturers.

International Nickel Co. Transfers Kropf, Haller

International Nickel Co., Inc., has announced the transfer of R. B. Kropf from the Cincinnati technical section to the Detroit technical section, where he will assist in the expanding defense activities of the Detroit area. C. T. Haller, formerly of the company's Pittsburgh technical section, has been placed in charge in Cincinnati.

Up until their transfers, both men had been members of the Executive Committees in their local chapters, Mr. Kropf in Cincinnati, and Mr. Haller in Pittsburgh, where he was also vice-chairman of the Publicity Committee and a former *Metals Review* chapter reporter.

Mr. Kropf has been in charge of Inco's Cincinnati technical section since its inauguration in 1945. He is a graduate of Michigan College of Mining and Technology and of University of Wisconsin.

Mr. Haller was graduated from Carnegie Institute of Technology in 1939. Before joining International Nickel in 1945, he served in metallurgical capacities with Carnegie-Illinois Steel Corp., Latrobe Electric Steel Co., and the Metals Research Laboratory at Carnegie Tech.

Case Institute Offers 81 Freshman Scholarships

Eighty-one scholarships for entering freshman students of science, engineering and management are available at Case Institute of Technology. The awards fall into three categories —six freshman prize scholarships, 12 Van Horn Activity Scholarships, and 63 general scholarships.

The six freshman prize scholarships are for full tuition ($650) and are awarded to the two Cuyahoga County winners and the four outside-Cuyahoga County winners of a competitive examination. The examination will be held in Tomlinson Hall on the Case campus on March 8, 1952, but students who live over 100 miles from Cleveland may take it in their own high schools by special arrangement.

The Van Horn scholarships are for part or full tuition for four years ($1300 to $2600). They are awarded to scholastically well-qualified students who also show marked leadership qualities and ability in athletics, music, speech, publications or other high school activity.

The 63 general scholarships are for part or full tuition for one year ($162.50 to $650 according to individual financial need). They are awarded to students who show unusual promise of success, combining high scholarship with leadership in activities. These scholarships are renewable to sophomores who have done creditable work in the freshman year, and to juniors and seniors as grants or loans.

Inquiries about these scholarships should be addressed to the Admissions Director, Case Institute of Technology, University Circle, Cleveland 6, Ohio.

Tells How Stainless Lining Is Applied To Pressure Vessel

Reported by W. N. Rice
Inspector, Bethlehem Steel Co.

How thin linings of stainless steel are applied to carbon steel pressure vessels was explained by M. A. Scheil, director of metallurgical research, A. O. Smith Corp., who talked before the Lehigh Valley Chapter A.S.M. at Students' Night on Nov. 30. Such linings are used to protect the load-carrying members against corrosion from the process in which the vessel is used.

Mr. Scheil's company pioneered a method of spot welding sheets of 22 different alloys of intermittent spot spacing, varying in thickness from 5/64 to 3/16 in., to carbon steel plates.

Various tests have been used to determine the limitations of these intermittently spaced resistance welded linings. Severe thermal shock was induced by repeatedly heating to 950° F. and cooling under steam and water. This treatment did not cause loosening of the bond attaching the linings to the carbon steel. Other methods of attaching linings, such as arc welding of strips or plug welding, were shown to be less adequate for thermal shock service. Strip widths of 3 and 4 in. bulged between the attachments welds, and after many hundred cycles of heating and quenching showed thermal fatigue cracks at the weld attachment.

The speaker discussed the results of the first year's exposure tests of seven 12% chromium stainless steels which are being studied for embrittlement caused by long cyclic heating at 750 and 900° F. The change in notch toughness was found to be associated with the chromium equivalents for the steels. Decrease in notch toughness with either exposure condition takes place above a 14% chromium equivalent and definite brittleness is shown at 16%. Molybdenum appears to retard embrittlement when added to either Type 405 or 410 stainless steel.

Mr. Scheil was introduced by H. F. Krohn, assistant metallurgical supervisor, Bethlehem Steel Co., who served as technical chairman. The meeting was attended by approximately 200 members and guests.

Officiating at the Students' Night Meeting of the Lehigh Valley Chapter Were H. F. Krohn of Bethlehem Steel Co., Technical Chairman; M. A. Scheil of A. O. Smith Corp., the Speaker; and R. B. Fisher, Chapter Chairman

DuPont Broadens Program Of University Grants and Post-Graduate Fellowships

The award of 75 post-graduate fellowships to 47 universities, and of grants-in-aid to 15 universities for the support of fundamental research, has been announced by E. I. du Pont de Nemours & Co. An authorization of $510,000 has been provided for the 1952-53 academic year, as compared to $405,400 for the present year.

Grants-in-aid to universities account for most of the increase. The yearly contribution for each of the ten universities receiving such grants has been raised from $10,000 to $15,000, and new grants of $10,000 each have been made to five additional universities. The only stipulation on the use of these funds is that they be devoted to fundamental chemical research—work prosecuted for the advancement of basic scientific knowledge and not for specific commercial objectives.

Institutions which will receive the $15,000 grants are California Institute of Technology, Cornell, Harvard, University of Illinois, Massachusetts Institute of Technology, University of Minnesota, Ohio State, Princeton, University of Wisconsin, and Yale. The $10,000 awards have been assigned for the first time to University of California at Berkeley, U.C.L.A., Columbia, Northwestern, and University of Michigan.

The post-graduate fellowships were instituted in 1918 to encourage students in chemistry, and have since been expanded to include other fields of science and engineering. Of the 75 fellowships, all of which are predoctoral, 45 are in chemistry, 15 in chemical engineering, five in mechanical engineering, four in physics, three in metallurgy, two in biochemistry, and one in biology. The three metallurgy fellowships have been awarded to Ohio State University, Carnegie Institute of Technology and Lehigh University. Each provides $1400 for a single person or $2100 for a married person, together with an award of $1200 to the university.

Also authorized was $20,000 for continuing the company's membership in the Institute for the Study of Metals, at University of Chicago.

Solidification TTT-Curves Applied to Practical Metal Casting Problems

Reported by A. S. Vince
Royal Canadian Mint

W. S. Pellini, well known for his research on the solidification of metals, addressed the Ottawa Valley Chapter A.S.M. on Dec. 4. Mr. Pellini is head of the foundry and welding group of the Naval Research Laboratory, Washington, D. C.

The speaker explained the novel concept of "solidification TTT-Curves" (time - thickness - transformation mode) and showed how these curves can be used to define the solidification of such commercially important metals as steel, aluminum, bronze and gray iron.

Evidence based largely on thermal analysis data obtained from embedded thermocouples shows that the mode of solidification of metals is not invariant but depends on such factors as liquidus-solidus range, thermal properties of the mold wall, conductivity of the metal, and solidification temperature. These various factors determine whether solidification occurs by formation of a narrow freezing band or by general "mushing".

The applicability of this information to practical foundry problems was demonstrated. The development of shrinkage areas, for example, is related to the characteristics of "progressive" and "directional" solidification developed in various geometrical casting shapes such as bars and plates.

Magnesium Industry Lauded for Efforts In Accumulating Data

Reported by A. D. Carvin
Joslyn Mfg. & Supply Co.

New applications for magnesium alloys are rapidly being found because of improved structural efficiency resulting from their use. This is true in each of the many forms in which magnesium is available—sand, permanent mold and die castings, forgings, sheet and structural extrusions.

This viewpoint was expressed in a talk on "Magnesium", presented to the Fort Wayne Chapter A.S.M. at a dinner meeting on December 10, by George H. Found, executive vice-president and general manager, Saginaw Bay Industries, Bay City, Mich. Prior to September 1951, Dr. Found was manager of technical service and development, Magnesium Division, Dow Chemical Co.

Dr. Found cited current commercial and military examples in each of the available forms to bring out this point. These included such applications as aircraft engine components, certain aircraft wheels, and airframe sheet and extrusion assemblies. Of the 15 to 20 tons of magnesium used in each B-36 bomber, about half is sheet.

Current Applications Cited

All of this has been made possible by the availability to the designer of data describing the physical and mechanical behavior of the metal as completely as for any other metal in common use today. The magnesium industry deserves the appreciation of the engineering profession for its intensive efforts to accumulate such data. The youthfulness of the industry and limited field experience with the metal have emphasized the urgency for such technical information.

The position of magnesium from an economic standpoint was reviewed for several commercial fields, including trucks and trailers, automotive and materials handling applications.

Various development projects reflect confidence in the future for magnesium. One of the projects of the Air Force today is the procurement of hydraulic forging presses larger than any hitherto manufactured. They are needed to forge large magnesium alloy parts for aircraft.

The cost of magnesium ingot is now competitive with such other materials as aluminum and zinc. In 1940 magnesium sold for 27c per lb. From 1943 to 1945, the price was 20.5c. At present it is 24.5c per lb. It is not conceivable that the supply of magnesium can ever be exhausted, since 0.13% of the ocean is magnesium.

Lectures on High-Temperature Alloys

Speakers' Table at Milwaukee Chapter Included E. Guenther, Chapter Secretary; R. Hershey, Member of the Executive Committee; E. Gammeter, Executive Committee and A. S. M. National Trustee; Ralph L. Wilson, Principal Speaker; J. Beyerstedt, Vice-Chairman; F. Nagler, Coffee Speaker; and R. Webb of the Executive Committee. (Photo by Mark Wallesz)

Reported by Donald R. Mathews
Allen-Bradley Co.

"Alloys for High-Temperature Use" was the subject presented by Ralph L. Wilson, A.S.M. national vice-president and director of metallurgy at Timken Roller Bearing Co., Steel and Tube Division, before a recent meeting of the Milwaukee Chapter A.S.M. Mr. Wilson substituted for his colleague, C. L. Clark, who was ill and could not attend.

Many slides were shown depicting creep and other properties of high-temperature alloys, which serve as a basis for establishing allowable stresses in design work. The talk called attention to the many problems confronting an engineer in selecting high-temperature materials for any given application.

Previous to the technical discourse, Forrest Nagler, chief mechanical engineer, Engineering Development Division, Allis-Chalmers Mfg. Co., gave an informative talk on archery, with particular emphasis on big-game hunting.

Urges Adoption of Modern Concept of Hardenability As Conservation Measure

Reported by J. S. Fullerton
Sales Representative
Handy & Harman of Canada, Ltd.

"A Simplified Concept of Heat Treatment and Hardenability", presented before the Montreal Chapter A.S.M. on Dec. 3 by John M. Hodge, of the Pittsburgh office of United States Steel Co., is based on the premise that steel is a mixture of hard particles (carbides) in a soft matrix (ferrite). The concept makes heat treatment a controlled process of obtaining a desired number, size and distribution of these hard particles.

Mr. Hodge urged his audience to adopt the "way of thinking" of the modern metallurgist. He should think of steel in terms of microstructure, the speaker explained, rather than in terms of type or specific composition, and think of heat treatment as a means of obtaining the desired microstructure, rather than as a magical process of changing the properties. Using this viewpoint, hardenability assumes its full and true significance as the factor which governs the range of sizes and conditions over which the desired microstructure can be obtained, rather than a mysterious attribute related to hardness.

Using slides of structures photographed under the electron microscope, Mr. Hodge followed the size and distribution of grain structure at various temperatures and times.

This concept of hardenability, the speaker pointed out in conclusion, led to the development of N.E. steels in the last war, and now makes possible the development and safe application of the still leaner boron and other alternate steels currently being produced. In these times of serious alloy scarcities, it is especially important that not only the metallurgist understand the fundamentals of this way of thinking, but also the man in the shop who heat treats and fabricates the steels, and the man in the office who specifies, purchases, or applies them.

Mr. Hodge was introduced by Chapter Chairman G. M. Young and thanked by Prof. J. U. MacEwan of McGill University. Technical chairman was A. Lewis, metallurgist, Dominion Engineering Works, Ltd. The coffee talk period was devoted to the premiere Canadian showing of the new United States Steel Film entitled "Walls Without Welds".

IMPORTANT MEETINGS *for March*

March 3-7 — American Society for Testing Materials. Spring Meeting and Committee Week, Hotel Statler, Cleveland. (R. J. Painter, Assistant Secretary, A.S.T.M., 1916 Race St., Philadelphia 3, Pa.)

March 4-6—Society of Automotive Engineers. National Passenger Car, Body and Materials Meeting, Book-Cadillac Hotel, Detroit. (John A. C. Warner, Secretary and General Manager, S.A.E., 29 West 39th St., New York 18, N. Y.)

March 10-14—National Association of Corrosion Engineers. Annual Conference and Exhibit, Buccaneer Hotel and Galveston Pleasure Pier, Galveston, Texas. (A. B. Campbell, Executive Secretary, N.A.C.E., 919 Milam Bldg., Houston 2, Texas.)

March 16-19—American Institute of Chemical Engineers, Atlanta Biltmore Hotel, Atlanta, Ga. (S. L. Tyler, Executive Secretary, A.I. Ch.E., 120 East 41st St., New York 17, N. Y.)

March 17-21—American Society of Tool Engineers. 9th Biennial A.S. T.E. Industrial Exposition, International Amphitheatre, Chicago. (Harry E. Conrad, Executive Secretary, A.S.T.E., 10700 Puritan Ave., Detroit 21, Mich.)

March 20-21—Pressed Metal Institute. Spring Technical Meeting, Hotel Carter, Cleveland. (E. M. Ross, P.M.I., 13210 Shaker Square, Cleveland 20, Ohio.)

March 23-27—American Chemical Society. National Meeting, Buffalo, N. Y. (Alden H. Emery, Executive Secretary, A.C.S., 1155 16th St., N.W., Washington 6, D.C.)

March 24-26—American Society of Mechanical Engineers. Spring Meeting, University of Washington, Seattle, Wash. (O. B. Schier, II, Meetings Manager, A.S.M.E., 29 West 39th St., New York 18, N. Y.)

March 26-28—American Power Conference, Sherman Hotel, Chicago. Sponsored by Illinois Institute of Technology and others. (R. A. Budenholzer, Conference Director; Professor of Mechanical Engineering, Ill. Inst. of Tech., Technology Center, Chicago 16, Ill.)

March 30-Apr. 3—American Chemical Society. National Meeting, Milwaukee, Wis. (Alden H. Emery, Executive Secretary, A.C.S., 1144 16th St., N.W., Washington 6, D. C.)

James M. Brown Dies

James M. Brown, manager of the Cleveland district industrial sales office of Surface Combustion Corp., passed away on Dec. 3, 1951.

Mr. Brown, 50, was born in Pittsburgh and was a graduate of Carnegie Tech. He had been associated with Surface Combustion since 1927. He was a member of the Cleveland Chapter A.S.M.

Boegehold Promoted By G. M., Succeeded By R. F. Thomson

Alfred L. Boegehold, A.S.M. past president, has been named assistant to the general manager of General Motors Research Laboratories. Mr Boegehold has been head of the metallurgy department at G.M. Research since 1925.

A. L. Boegehold

After graduation from Cornell University with a Mechanical Engineering degree in 1915, Mr. Boegehold was successively employed by Remington Arms & Ammunition Co. as metallographer and metallurgist, by Bridgeport Brass Co., by Remington Union Metallic Cartridge Corp., and by U.S. Army Ordnance, doing research on Browning machine gun barrel steels. He joined the General Motors Laboratories in 1920.

Mr. Boegehold delivered the annual A.S.M. Campbell Memorial Lecture in 1938, and served as national president of the Society in 1947-48. He is also a recipient of the J. H. Whiting Gold Medal of the American Foundrymen's Society, and a former member of the executive committee of the Iron and Steel Institute of the A.I.M.E. Mr. Boegehold has contributed a long list of publications to technical societies since 1929.

Succeeding Mr. Boegehold as head of the metallurgy department is Robert F. Thomson, who joined the G.M. Laboratories in October 1950. He received his B.S. in Engineering from University of Michigan in 1937, and his Master's and Doctor's degrees in 1940 and 1941.

For several years Dr. Thomson was employed by the DeSoto Division of Chrysler Corp. and later by Dodge Chicago plant in quality control and inspection of aircraft engines and parts. From 1945 to 1950 he was employed by the development and research division of International Nickel Co., assigned to the field office in Detroit. He is currently vice-chairman of the Detroit Chapter A.S.M.

Ordnance Corps Offers Contracts for Research

The Army Ordnance Corps has established an Office of Ordnance Research which is supporting basic research in the broad fields of physics, chemistry, and mathematics, and in more specialized subjects such as metallurgy. Proposals for basic research projects to be done under contract with this office are solicited from staff members of universities, colleges, and other research institutions. Investigators are encouraged to suggest research subjects in which they have a strong interest and which will significantly advance fundamental knowledge. Sponsored projects may be used in the training of research students.

Proposals for research to begin during the fall term should be submitted by March 31. Further details on the Ordnance Corps program can be obtained from the Office of Ordnance Research, 2127 Myrtle Drive, Duke Station, Durham, N. C.

Technical Papers Invited for A.S.M. Transactions

The Publications Committee of the A.S.M. will now receive technical papers for consideration for publication in the 1953 *Transactions* and probable presentation before a national meeting of the Society. A cordial invitation is extended to all members and nonmembers of the A.S.M. to submit technical papers to the society.

Many of the papers approved by the committee will be scheduled for presentation on the technical program of the 34th National Metal Congress and Exposition to be held in Philadelphia, Oct. 20 to 24, 1952, or the Western Metal Congress in Los Angeles, March 23 to 27, 1953. Papers that are selected for presentation will be preprinted and manuscripts should be received at A.S.M. headquarters office not later than April 10, 1952.

Acceptance of a paper for publication does not necessarily infer that it will be presented at either of these conventions. The selection of approved papers for the convention programs will be made in early June. A preference for either of the two conventions should be indicated.

Manuscripts in triplicate plus one set of unmounted photographs and original tracings, should be sent to the attention of Ray T. Bayless, assistant secretary, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

Headquarters should be notified of your intention to submit a paper, and helpful suggestions for the preparation of technical papers will be sent.

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Baltimore	Mar. 17	Engineers' Club		Steel Inspection at the Mill
Birmingham	Mar. 5	Hoopers Cafe	E. E. Thum	Metallurgical Implications of Atomic Energy
Boston	Mar. 7	Hotel Shelton		Panel Discussion on Light Energy
			R. L. Templin	Aluminum
			J. C. McDonald	Magnesium
			T. W. Lippert	Titanium
Buffalo	Mar. 13	Hotel Sheraton	J. Villela	Metallography
Calumet	Mar. 11	Phil Smidt & Son, Whiting, Ind.	A. W. F. Green	Jet Engines
Canton-Massillon	Mar. 11	Mergus Rest.		Rolling & Forging of Alloy Steels (Panel Discussion)
Chattanooga	Mar. 4	Park Hotel	E. E. Thum	Metallurgical Implications of Atomic Energy
Chicago	Mar. 10	Furniture Club of America	J. R. Long and Julian Glasser	Titanium
Cincinnati	Mar. 13	Engineering Society	G. E. Brumbach	Uses and Misuses of Toolsteel
Cleveland	Mar. 3	Hollenden Hotel	L. H. Sudholtz	Machinability of Metals as Affected by Cutting Fluids
Columbus	Mar. 5	Broad St. Church of Christ	Russell Franks	Stainless Steels
Dayton	Mar. 12			Plant Visit to Moraine Products Division, G.M.C.
Des Moines	Mar. 11		H. A. Wilhelm	Rare Metals and Castings
Detroit	Mar. 10	Rackham Bldg.	L. A. Danse	Sustaining Members and University Night
Eastern N. Y.	Mar.	Circle Inn, Lathams, N. Y.		
Fort Wayne	Mar. 10	Howard Johnson's Rest.	William Brooks	Metallurgical Aspects of Welding
Georgia	Mar. 3	Atlantic Steel Co.	E. E. Thum	Metallurgical Implications of Atomic Energy
Hartford	Mar. 11			Plant Visitation
Indianapolis	Mar. 17	McClarney's Restaurant	F. G. Tatnall	Up-to-Date Testing of Materials
Lehigh Valley	Mar. 7	Hotel Traylor, Allentown, Pa.	R. A. Grange	Boron Steels
Los Angeles	Mar.	Rodger Young Audit.		National Officers Night
Louisville	Mar. 4	Seelbach Hotel	Raymond Meyers	Dental Metallurgy
Mahoning Valley	Mar. 11	Post Room, V.F.W.	D. E. Babcock	Application of Chemistry to Solution of Problems in Process Chemistry
Milwaukee	Mar. 18	Hotel Wisconsin	F. G. Tatnall	Fatigue and Life Testing
Missouri School of Mines	Mar. 12			
Montreal	Mar. 3	Spanish Room, Queens Hotel	John Chipman	The Growing Science of Metallurgy
Muncie	Mar. 11			Panel Discussion
New Haven	Mar. 20	Hotel Elton, Waterbury	W. L. Finlay	Titanium
New Jersey	Mar. 17	Essex House, Newark	Richard Flinn	Nodular Cast Irons
New York	Mar. 10	Schwartz Restaurant	W. L. Finlay	Titanium - Nature and Application
North West	Mar. 20	Covered Wagon	A. L. Leonard	Electroplating
Northern Ontario	Mar. 19	Windsor Hotel		Stump the Experts Night
Notre Dame	Mar. 12		Don Ruhnke	Boron Steels
Oak Ridge	Mar. 19	K. of C. Hall, Jefferson Circle	F. L. LaQue	Corrosion and the Final Choice
Ontario	Mar. 7	King Edward Hotel, Toronto		Ladies' Night
Ottawa Valley	Mar. 4	Murphy-Gamble Rideau Room	John Chipman	Metallurgical Education
Penn State	Mar. 11	Mineral Industries Art Gallery	T. W. Lippert	Titanium
Philadelphia	Mar. 28	Franklin Institute	A. B. Kinzel	Trends of Metallography
Pittsburgh	Mar. 13	Roosevelt Hotel	Morris Cohen	Hardening and Tempering of Steel
Purdue	Mar. 19	Purdue Union	F. G. Tatnall	Testing, Up-to-Date and Simplified
Rochester	Mar. 10	Chamber of Commerce	V. N. Krivobok	Stainless Steel, Corrosion and Protection
Rocky Mountain Pueblo / Denver	Mar. 20 / Mar. 21		W. L. Sheppard	Metallurgy in the Budd Co.
Rome	Mar. 3	Elk's Club	W. M. Williams / F. V. Schatz	The Roll of Spectroscopy and X-Ray Diffraction in Industry
Saginaw Valley	Mar. 18	Fischer's Hotel, Frankenmuth	Walter B. Cheney	Marquenching
Southern Tier	Mar. 10	Hotel Clinton	Paul D. Frost	Titanium Alloys and Their Applications
St. Louis	Mar. 21	Forest Park Hotel	V. T. Malcolm	Recent Advances in Metallurgy
Springfield	Mar. 17	Sheraton Hotel	C. E. Peck	Controlled Atmospheres
Terre Haute	Mar. 3			Soft Soldering
Texas	Mar. 4	Ben Milam Hotel	Dan J. Martin	Critical Alloys in Ordnance Materiel

Tri-City	Mar. 4			Inspection and Testing
Tulsa	Mar. 10		R. L. Lerch	Corrosion Resistant Alloys
Washington	Mar. 10	Old New Orleans Rest.	B. W. Gonser	New Developments in the Unusual Metals
West Michigan	Mar. 17		Col. B. S. Mesick	Materials Engineering in Ordnance Automotive Equipment
Wichita	Mar. 18	K of C Hall	John Alden	Heat Treatment of Aluminum Alloys
Worcester	Mar. 12	Hickory House	S. F. Richardson	Jet Propulsion
York	Mar. 12	Lancaster, Pa.	B. W. Gonser	The Unusual Metals—Their Growing Importance

"Metallurgist in Gypsum" Is Inland Empire Speaker

Reported by F. M. Krill
Kaiser Aluminum & Chemical Corp.

"A Metallurgist in Gypsum" was personified before the Inland Empire Chapter A.S.M. on Oct. 23. The speaker was John C. Tenold, a metallurgical engineer from University of Minnesota, chief engineer for Columbia Gypsum Products, Inc., a Spokane operation begun in 1947.

This company has gypsum deposits just south of Banff, B. C., which are quarried for them by a contractor and shipped to their Spokane Valley plant. The company produces agricultural gypsum, hard-wall plaster and non-load-bearing partition tile.

The chief plant operation, according to Mr. Tenold, is calcining, which converts the gypsum to plaster-of-paris. Other operations are normal crushing, grinding and drying. Ball-milling to produce a "leafy" structrue and the addition of sisal for green strength are part of the hard-wall plaster production. The partition tile is made by pouring a plaster mixture into molds. When set it is removed and air dried for use.

The company is in a good economic position since its nearest competitor is over 600 miles away. More products are planned for later development.

After the discussion period, the members were taken on a tour of the plant.

Ductile Iron Seen as Ideal For Pressure Castings

Reported by R. C. Pocock
Bendix Products Division

Ductile iron, containing spheroidal graphite, is produced in this country by use of the magnesium process, Keith D. Millis of International Nickel Co., Inc., explained before the Notre Dame Chapter A.S.M. on Nov. 14. The process consists of the addition and retention of a small but effective amount of magnesium in the iron, which causes the graphite to occur in the form of spheroids rather than flakes.

As a result, the mechanical properties are similar to those of common grades of steel, and a correlation exists between hardness, tensile strength and elongation. Stress is proportional to strain within the proportional limit, and the modulus of elasticity is 24,500,000 to 26,000,000 psi. It responds to heat treatment in essentially the same manner as steel.

The material has a large advantage over other cast materials in its ability to be cast pressure tight—in fact, it is just about ideal for such applications. Its resistance to heat and growth is outstanding, and its wear resistance is equal to or better than the best grades of gray iron. Fatigue properties are comparable to the ordinary grades of steel, and the material can be welded.

All Phases of Steelmaking Seen In Welding Process

Reported by William L. Smith
Oklahoma Steel Castings Co., Inc.

The physical operation of joining two metals by fusion seems simple to a welding operator, but to the metallurgist it is a complicated process. In fact, welding of steel may be said to cover practically all phases of steelmaking, according to D. C. Smith, chief metallurgist of the Harnischfeger Corp., speaking at the December meeting of the Tulsa Chapter A.S.M., held jointly with the American Welding Society.

In the welding process, Mr. Smith went on to explain, fusion in the V-groove of a butt weld is followed by a rapid chill due to the mold effect of the parent metal. A physical stress is set up by shrinkage as the metal is cooled. A heat treating effect results from the input of heat, and the tensile strength is increased by the chilling and structure change of the metal around the weld area.

Porosity or under-bead cracking is caused by the collection of hydrogen in cavities while the steel is in the austenitic form. It is more common in the higher carbon steel because of the greater formation of austenite. Hydrogen in the atomic state is soluble in all steel, but in the molecular state it is soluble only in austenitic steel.

Crystal formations of steels were described in lantern slides, and the importance of steel composition was illustrated by the iron-carbon diagram.

A knowledge of the heat treating properties of steel will tell whether or not a steel may be welded without preheating. A high preheat was recommended by the speaker to prevent crater-cracking in martensitic 4 to 6% Cr steel.

To prevent the formation of martensite in the heat-affected weld area, which results in high hardness and low ductility, two passes were recommended instead of a single fillet weld. Much cracking has been experienced in good heat treating steels when one pass was used. Some fabricators have gone to the use of a larger rod and a slower welding rate to give a slower chilling rate and prevent cracking in a one-pass weld.

Twenty Years Ago
Quotes From *Metals Review* February 1932

"Muncie (Ind.) is the newest local section of the A.S.S.T. On Jan. 14 an organization meeting was held at the Muncie Products Division of General Motors Corp. . . . W. E. Sanders, Muncie Products Division, was elected chairman. . ."

Birmingham Has Joint Meeting on Welding

Speakers' Table at the December Meeting of Birmingham Chapter Included F. R. O'Brien of Southern Research Institute, Coffee Speaker; S. F. Carter, Chairman, Birmingham Chapter A. S. M.; A. E. Pearson, Chairman of the Local Chapter of American Welding Society; Robert D. Stout of Lehigh University, Speaker; and Don Curry, Vice-Chairman of A. W. S.

Reported by Robert Bramlette
American Cast Iron Pipe Co.

A program on "The Metallurgy of Arc Welding" was presented by Robert D. Stout of Lehigh University before a joint meeting of the Birmingham Chapter A.S.M. with the American Welding Society on Dec. 12.

Dr. Stout described and illustrated the changes in structure which occur in the base metal in the vicinity of the weld. Three main factors in the prevention of weld cracks are heat input, rate of cooling and rate of welding. Shrinkage causes stresses, which in turn can cause cracks. The cracks appear between the grains of the columnar structures at right angles to the parent metal.

Notch toughness of welded plate can be substantially improved, Dr. Stout said, by heat treatment of the base metal, both before and after welding. Normalizing before welding reduces the pearlite grain size and is conducive to homogeneity of grain size. Both of these conditions are desirable for notch toughness in welded steel structures.

Failures can frequently be traced to introduction of hydrogen and to martensite structures in the base plate around the weld. A hardness of Brinell 350 was found to be the point above which the combination of hydrogen and martensite can cause cracking. Multipass welding is beneficial in that each pass imparts a heat treatment effect to previous passes.

Tests were illustrated that determined and compared the crack sensitivity of various compositions and welding techniques.

Prior to Dr. Stout's talk, F. R. O'Brien, assistant director of Southern Research Institute, presented the coffee talk.

Air Hardening Toolsteels Favored Over Other Types

Reported by H. A. Ball
Chief Inspector, Western Brass Mills

An argument in favor of using air hardening toolsteels as compared to other types was presented in St. Louis by John A. Koch, assistant regional manager of Carpenter Steel Co. The meeting was sponsored jointly on Jan. 3 by the local chapters of the A.S.M. and the American Society of Tool Engineers.

There are three major classifications of the air hardening group, Mr. Koch indicated—namely, the high-carbon, high-chromium type, the 5% Cr type, and the low-temperature air hardening type. These three classifications were compared to similar steels in the oil hardening group.

Three questions were considered in making the comparison: (*a*) how tough? (*b*) how do they wear? and (*c*) what is the distortion factor? All points brought out in this comparison indicated that there are advantages in using the air hardening toolsteels over the oil hardening and water hardening steels in a general classified manner.

However, some penalties are involved in using the air hardening toolsteels, and Mr. Kohn pointed out the sacrifice in machinability and cleanup after treatment, particularly when using the first two types (high-carbon high-chromium, and the 5% Cr types). In using the third type (low-temperature air hardening), no sacrifice is made over the corresponding oil hardening or water hardening grades.

The talk was well illustrated with slides and presented strictly in layman's parlance.

Junior Members'

PLACEMENT SERVICE

Listed on the following pages are the qualifications of junior members of the American Society for Metals who are graduating (or who are candidates for advanced degrees) in the field of metallurgy. All of these men will be available between now and next summer. They are grouped according to the school attended, on the pages indicated by the table of contents below. The name of the head of the department of metallurgy at the school, and in most instances, the name of the faculty member in charge of student placement, is indicated. Further information about any of these graduates may be secured from the head of the department or by writing to the student direct.

continued from Page 19

University of Alabama

Jack E. Bolt

Degree Expected: M. S. in Met. Eng.

School Address: Box 1411, University, Ala.

Home Address: 3540 27th St., North, Birmingham 7, Ala.

Age 27, married, two children. Lt. j.g., U.S.N.R. B.S. in Mech. Eng., Georgia Tech, '45. Graduate studies at U.S. Naval Academy. Five years foundry production experience—18 months supervisory apprenticeship, 3 years melting and annealing foreman, 3 months in research. Presently foundry instructor at University of Alabama while doing graduate work. Thesis: "Phosphorus Removal in Basic Cupola Operation". Prefers development, research, or production in ferrous metals. Any location. Available June.

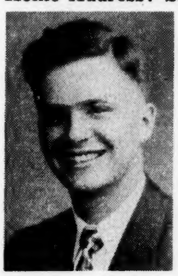
Polytechnic Institute of Brooklyn

Frank Hodi

Degree Expected: B. Met. Eng.

School Address: 44-74 21st St., Long Island City 1, N. Y.

Home Address: Same



Age 21, single; draft status 1S (c). Thesis topic: Liquid Cyaniding. Studies include solid phase and phase transition, spectroscopy, ferrous and nonferrous metallography and alloy steel metallography. Desires work in ferrous producing industry. East preferred. Available June.

Alvin J. Jacobs

Degree Expected: B. Met. Eng.

School Address: 85 Livingston St., Brooklyn 2, N. Y.

Home Address: 444 Jamaica Ave., Brooklyn 8, N. Y.

Age 23, single; 4F draft status (polio, right leg). B.A. from New York University. Courses include physical chemistry, ferrous and nonferrous metallurgy, ferrous metallography, electrometallurgy, thermodynamics, materials testing, welding and design, solid state physics. Thesis: Effect of Cross-Bending and Fatigue on the Recrystallization of Copper. Phi Beta Kappa. Desires research or development work in physical metallurgy. Northeastern U.S. preferred. Available mid-June.

Alfred C. Pezzi

Degree Expected: B. Met. Eng.

School Address: 99 Livingston St., Brooklyn, N. Y.

Home Address: 168 Bleecker St., Brooklyn 21, N. Y.

Age 21, single; draft status 2A-S. Courses include ferrous and nonferrous process metallurgy and metallography, pyrometry, electrometallurgy, welding and design, alloy steel metallography, industrial metallurgy, and met. thermodynamics. Thesis: Chromizing of Mild Steels With Gaseous CrF. Activities include track and field, school paper, and treasurer of A.I.M.E. Chapter. Desires research or sales work with nonferrous producing industry, preferably in New England. Available June 10.

Francis J. Pianki

Degree Expected: B. Met. Eng.

School Address: 14-17 122nd St., College Pt., New York 56, N. Y.

Home Address: Same

Age 23, married; draft status 4A, veteran. Thesis: Isothermal Annealing of Copper Under Applied Tension. Courses in ferrous and nonferrous metallurgy and metallography, materials testing, phase transitions in metals, industrial metallurgy, mineralogy and microcopy, powder metallurgy. Part time (1 year) as laboratory instructor in materials testing lab. Radar technician (2 years) in U. S. Navy. Prefers work in production, process development, or research. Any location. Available August 1.

Alvin L. Sundin

Degree Expected: B. Met. Eng.

School Address: 450 44th St., Brooklyn 20, N. Y.

Home Address: Same

Age 25, single, veteran; draft 4A. Courses include ferrous, nonferrous, and alloy metallography and metallurgy, industrial metallurgy, electrometallurgy. Electives include spectroscopy, powder metallurgy, applied material testing, solid phase and phase transitions, casting design. Thesis subject: Study of Diffusion Rates and Temperature Effects of Chapmanizing. Experience includes 1 year as laboratory technician (inspection and control) and 1½ years as machinist. Desires ferrous producing industry or works laboratory. Sales considered. N. Y. City and vicinity preferred. Available June 16.

Alfred Younghem

Degree Expected: B. Met. Eng.

School Address: 240 W. 102nd St., New York 25, N. Y.

Home Address: Same

Age 24, single, veteran. Major studies: Industrial metallurgy, ferrous and nonferrous metallurgy, pyrometry, refractory materials, electrometallurgy. Three years experience in a secondary metal smelting plant. Knowledge of nonferrous scrap. Prefers work with primary or secondary metal producer. Any location. Available June 1.

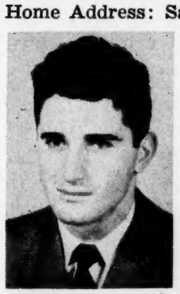
University of British Columbia

Giuseppe Magnolo

Degree Expected: B. A. Sc. in Met.

School Address: 4629 W. 12th Ave., Vancouver, B. C.

Home Address: Same



Age 24, married, no children. Courses include both chemical and physical metallurgy and some ore dressing. Experience with Consolidated Mining and Smelting Co. of Canada, Limited, and with various foundries in the Vancouver area. Would like work with ferrous or aluminum industries in Canada. Available June 1.

FOR FURTHER INFORMATION about these graduates
Write direct to student or to head of metallurgy department or placement bureau at the school. *See list on pages 19 and 20.*

British Columbia (Cont.)

George P. Shirokoff
Degree Expected: B. A. Sc. in Met. Eng.
School Address: 1906 West 11th Ave., Vancouver 9, B. C.
Home Address: Same

Age 28, married. Courses include chemical and physical metallurgy, metallography and metallurgical engineering calculations. Worked summer as lab. technician in steel foundry. Desires industrial or producing industry, ferrous preferably. Canada preferred. Available June 1.

University of California

Richard C. Butler
Degree Expected: B. S. in Met. Eng.
School Address: 242 W. Bissell Ave., Richmond 5, Calif.
Home Address: Same

Age 24, married; draft status 3A. Courses include qualitative analysis, physical chemistry, physics, physical metallurgy, inspection of metals, metallurgy of iron and steel, nonferrous pyrometallurgy, mineral concentration, hydrometallurgy, mineral exploitation, mining machinery and equipment, petrology, economic geology, analytic geometry, calculus, strength of materials, and electricity. Worked as turret-lathe operator, garage mechanic, and laboratory technician with aluminum research project. Desires foreign or domestic, producing or consuming, industry. Available now.

William Scott Gibbons, Jr.
Degree Expected: B. S. in Met. Eng. (Physical)
School Address: 189 Warwick Ave., San Leandro, Calif.
Home Address: Same

Age 21, single; 2A(S) status, Courses include physical metallurgy, properties and forming of metals, inspection of metals, X-ray metallography, advanced metallography, metallurgy of welding, process metallurgy, and physical chemistry. Secretary of student chapter of A.I.M.E.; Theta Tau. Summer experience in iron foundry as laborer and helper, also chemistry and sand laboratory experience in steel foundry. Desires iron and steel industry, especially foundry. West preferred, but not essential. Available July 1.

William R. Smith
Degree Expected: B. S. in Phys. Met.
School Address: 1406 Santa Fe Ave., Berkeley 2, Calif.
Home Address: Same

Age 34, married, two children, veteran. Courses include physical metallurgy, properties and forming of metals, inspection of metals, metallurgy of welding, X-ray metallography, advanced metallography. President of Student Chapter A.I.M.E. Five years experience as combination welder and two years as welding supervisor. Prefers welding development or welding engineering. No preferred area. Available July 1.

Carnegie Institute of Technology

Carl D. Finder
Degree Expected: B. S. in Met. Eng.
School Address: 5100 Forbes St., Pittsburgh 13, Pa.
Home Address: 478 Maywood Ave., Maywood, N. J.

Age 22, single; draft status 2S. Attended University of Virginia. Courses include physical metallurgy, metallurgical operations, process metallurgy, metallurgical seminars, ferrous and nonferrous metallurgy, mechanical metallurgy, ferrous and nonferrous metallography. Worked summers as general laborer and student engineer in aluminum and steel industries respectively. Desires industrial or engineering sales, or process engineering, preferably nonferrous, but will accept offer in ferrous. No location preference. Available June 14.

Sidney F. Kaufman
Degree Expected: B. S. in Met. Eng.
School Address: 363 Tyler Ave., Washington, Pa.
Home Address: Same

Age 23, married, one child, veteran. Attended Washington and Jefferson College two years. Courses include physical chemistry, physical, process. ferrous, nonferrous and mechanical metallurgy; principles of metallurgical operations; seminar; ferrous and nonferrous metallography; and metallurgical engineering. Senior Thesis: Kinetics of the Mn Reaction Under Simulated Blast Furnace Conditions. Summer work: glass factory and steel process metallurgy lab. Prefers producing or consuming industry, ferrous metals. No territory preference. Available June.

Robert M. Stackhouse
Degree Expected: B. S. in Met. Eng.
School Address: Mount Royal Blvd., Glenshaw, Pa.
Home Address: Same

Age 23, single; veteran 4A. Courses in physical metallurgy, ferrous and nonferrous metallurgy, ferrous and nonferrous metallography, physical chemistry, metallurgical operations and process metallurgy. Summer work as electrician's helper in steel forming mill. Desires production and development work. East preferred. Available June 15.

Case Institute of Technology

Russell A. Brown
Degree Expected: B. S. in Met. Eng.
School Address: 560 Parkside Blvd., South Euclid 21, O.
Home Address: Same

Age 21, single; draft status 1D (U.S. Naval Air Reserve). Courses include physical metallurgy, production metallurgy, physical chemistry, minerology, geology, mechanical properties of metals, ore dressing, advance ferrous metallurgy, advance physical metallurgy, nonferrous foundry, welding. Activities include athletics, fraternity, Boosters, Pick and Shovel Club. Desires research or production work in Cleveland area preferably. Available June 9.

Case Tech (Cont.)

Kenneth D. Carter

Degree Expected: B. S. in Met. Eng.

School Address: 2032 Abington Rd., Cleveland 6, Ohio
Home Address: 3001 Trowbridge Ave., Cleveland 9, Ohio

Age 23, single; draft status 4A. Training in ferrous and nonferrous foundry, phys. met. production met., phys. chem., welding, and industrial organization. Summer work as assistant to the metallurgist in a modern gray iron foundry. Active in several extra-curricular activities including senior basketball manager. Prefers industrial work in either a ferrous or nonferrous foundry in or around the Cleveland district. Available June 15.

Emil Chirila

Degree Expected: B. S. in Met.

School Address:13424 Harlan Ave., Lakewood 7, Ohio
Home Address: Same

Age 25, veteran, single; draft status 4A. Majoring in foundry. Business electives. Worked at Ford Motor Co. in foundry during two summers. Foundry Educational Foundation Scholarship for 2½ years. Desires work in ferrous foundry, production. Lake Erie region.

John W. Gross

Degree Expected: B. S. in Met. Eng.

School Address: 3594 W. 47th St., Cleveland 2, Ohio
Home Address: Same

Age 22, single; 2A-S (to June, 1952). Courses include all prescribed metallurgical engineering subjects and advanced ferrous metallurgy, metal forming, welding, business law, economics, psychology, and mineralogy. Summer work in steel inspection and drill test departments, and also in a steel foundry. Prefers producing industry, either ferrous or nonferrous. Northeast preferred, but not essential. Available June 9.

Donald T. Kauer

Degree Expected: B. S. in Met. Eng.

School Address: 7220 Hecker Ave., Cleveland 3, Ohio
Home Address: Same

Age 23, single; 1A draft status. Attended Ohio State University for one year. Courses include physical metallurgy, physical chemistry, ferrous and nonferrous production metallurgy, advanced ferrous metallurgy, advanced physical metallurgy, welding and geology. Over three years industrial experience with two years in chemical and metallurgical research laboratories. Prefers production, operational research or sales. No location preference. Available June.

Donald J. Lamvermeyer

Degree Expected: B. S. in Met. Eng.

School Address: Phi Delta Theta, 2139 Abington Rd., Cleveland 6, Ohio
Home Address: R.D. 2, Oberlin, Ohio

Age 21, single; 2S draft status. Courses include physical chemistry, elementary physical metallurgy, advanced physical metallurgy, production metallurgy, foundry technology, nonferrous foundry, advanced ferrous metallurgy. One summer of work in nonferrous foundry. Prefers producing industry with ferrous metals or nonferrous foundry. No territory preference. Available June.

Paul R. Layman

Degree Expected: B. S. in Met. Eng.

School Address: 2114 Stearns Rd., Cleveland 6, Ohio
Home Address: 109 South Burgess Ave., Columbus, Ohio

Age 23, single, veteran. Courses include all prescribed metallurgical engineering courses including physical metallurgy, physical chemistry, mineral dressing, ferrous and nonferrous production, and economics, cost accounting, industrial organization, and business law. Aviation electronics technician in Navy. Experience in sheet metal work and as sales clerk. Interested in sales or production work. Midwest preferred but not essential. Available June 10.

Paul L. Mehr

Degree Expected: B. S. in Met. Eng.

School Address: 2077 Cornell Rd., Cleveland, Ohio
Home Address: 3420 W. 117th St., Cleveland, Ohio

Age 21, single. Courses include metallurgical calculations, mineralogy, ore dressing, mechanical properties of metals, physical chemistry, physical metallurgy, production metallurgy, advanced ferrous metallurgy, nonferrous foundry and welding. Summer work as research assistant at Union Carbide and Carbon Research Laboratories, Inc., Electro-Metallurgical Division, Niagara Falls, N. Y. Desires producing or development industry. No territory preference. Available June 16.

John C. Pastiran

Degree Expected: B. S. in Met. Eng.

School Address: 12108 Craven Ave., Cleveland 5, Ohio
Home Address: Same

Age 29, single, veteran. Instructor in U. S. Army Ordnance. Principal studies in production metallurgy, physical metallurgy, mineral dressing, advanced ferrous metallurgy, foundry metallurgy and technology. Experience as lab. asst. in metallurgical testing and chem. analysis in tube production plant. Desires work in ferrous production control (phys. met.)—i.e. heat treating dept. Cleveland area preferred. Available June 9.

FOR FURTHER INFORMATION about these graduates
Write direct to student or to head of metallurgy department or placement bureau at the school. *See list on pages 19 and 20.*

Case Tech (Cont.)

Dan D. Profant

Degree Expected: B. S. in Met. Eng.

School Address: 2577 St. Olga, Apt. E. Cleveland 13, Ohio
Home Address: 767 15th St. S.E., Massillon, Ohio

Age 32, married, two children, veteran—Major in Air Force inactive reserve. Courses include foundry, physical metallurgy, ferrous and nonferrous production metallurgy. Member Tau Beta Pi and former president of departmental club. Experience—two years as openhearth laborer, one year part time in foundry, one year in research and development department of steel company involving studies on coke and desulphurization of iron. Desires ferrous production or quality control. Midwest preferred. Available June.

Ford J. Ragland, Jr.

Degree Expected: B. S. in Met. Eng.

School Address: 1639 Rosewood Ave., Lakewood 7, Ohio
Home Address: Same

Age 22, single; draft status 1D. Thesis: Unnotched Impact Strength of a High Speed Steel. Studies include ore dressing, metallurgy of iron and steel, advanced ferrous metallurgy, optical mineralogy, nonferrous production metallurgy, welding, advanced physical metallurgy. Summer experience in selling, metallurgical steel inspection, and heat treating. First choice ferrous industry. Cleveland area preferred but not essential. Available June 16.

William A. Sanders

Degree Expected: B. S. in Met. Eng.

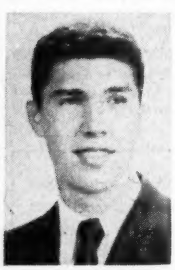
School Address: 9807 Baltic Rd., Cleveland 2, Ohio
Home Address: Same

Age 21, single; 1A draft status. Studies include mechanical properties of metals, ore dressing, physical chemistry, physical metallurgy, production metallurgy, ferrous foundry, nonferrous foundry, foundry technology, practical metallurgical engineering. Foundry Educational Scholarship. Social fraternity and departmental club. Worked summers as foundry hook-up man, and as tester and inspector at Cleveland Twist Drill Co. Prefers ferrous jobbing and production foundry in Cleveland or vicinity. Available June.

Edward A. Steigerwald

Degree Expected: B. S. in Met. Eng.

School Address: 2635 E. 127th St., Cleveland 20, Ohio
Home Address: Same

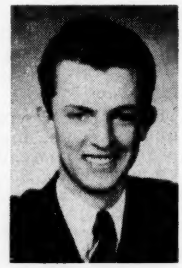


Age 21, single; 2A-S draft status. Studied ore dressing, metals forming, ferrous and nonferrous production, advanced physical metallurgy, practice of metallurgical engineering, nonferrous foundry. Student publications, honoraries, class president. Worked one summer as a lab technician for a cutting tool company. Prefers production or research work in midwest. Available June 15.

Miles Owen Weaver

Degree Expected: B. S. in Met. Eng.

School Address: 2133 Abington Rd., Cleveland 6, Ohio
Home Address: Rural Route #3, Box 129, Piqua, Ohio



Age 22, single; 2A-S draft status. Courses include mechanical properties of metals, ore dressing, physical chemistry, physical metallurgy, qualitative and quantitative analysis, production metallurgy, advanced ferrous metallurgy, forming of metals. Worked summers in a quality control lab and also as a laborer in a high-speed drill plant. Prefers production or development in a ferrous, aluminum, or copper industry. Midwest preferred but not essential. Available June 16.

University of Cincinnati

Leonard Grossman

Degree Expected: Met. Engr.

School Address: L. B. Harrison Club, Victory Pkwy. and E. McMillan St., Cincinnati, Ohio
Home Address: 935 Marion Ave., Cincinnati 29, Ohio

Age 22, single; draft status 1A. All foundry electives in addition to prescribed courses. Member Tau Beta Pi, Phi Lambda Upsilon, Phi Eta Sigma Honoraries. Foundry Educational Foundation Scholarship. Co-op work in bronze, iron, and steel foundries, rolling mill, research lab. Prefers foundry sales or production. No location preference. Available July 1.

Homer Dick Lewis

Degree Expected: Met. Engr.

School Address: 233 Latonia Terrace, Covington, Ky.
Home Address: Same

Age 25, married, one child, veteran, R.O.T.C. Courses include physical chem., chemical thermodynamics, heat treating, electrometallurgy and surface reactions, general process metallurgy, theories of mechanical working, steel selection, specification and hardenability, theories of metallurgy, electrical engineering fundamentals. Co-op work experience includes nonferrous foundry quality control, molding sand control and research, radiography, physical testing of materials, mass spectrograph testing of castings, metallography. Prefers fabricating, ferrous or nonferrous; nonferrous foundry. Midwest or West. Available Aug. 1.

Donald L. Moore

Degree Expected: Met. Engr.

School Address: 3411 Hilda Ave., Cheviot, Ohio (Cincinnati 11)
Home Address: Same

Age 23, single; draft status, 2A-S. Courses include casting, welding, extraction, powder, physical, and electrometallurgy; heat treatment, failure analysis, metallography, theories of metallurgy, physical chemistry thermodynamics, economics, patent law. Chairman annual Co-Op Day, assist. editor Engineering College magazine; O.S.P.E. Book award. Work experience includes chemical, physical, metallographic, radiographic laboratory; machine shop; foundry production and control (brass, aluminum, nickel, monel). Prefers production, sales, or personnel work. Midwest preferred, not essential. Available June 1.

Cincinnati (Cont.)

Lewis Stoll

Degree Expected: Met. Engr.

School Address: 106 Hosea Ave., Cincinnati 20, Ohio
Home Address: 1515 51st St., Brooklyn 19, N. Y.

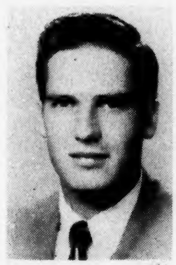
Age 21, single. Reserve lieutenant. Courses include two years physical chemistry, differential equations, two years physical metallurgy, metallography, corrosion, electroplating, all metallurgical operations, 1½ years accounting. President Pi Lambda Phi, three years varsity fencing team, debating team, newspaper and engineering magazine. Cooperative work experience includes steel rolling mill, gray and ductile iron foundry, metallurgical laboratory, machine design and systems analysis. New York preferred, but not essential. No work type preference. Available August 1.

Richard A. Wolfe

Degree Expected: Met. Engr.

School Address: 4376 Homelawn Ave., Cincinnati 11, Ohio
Home Address: Same

Age 22, single; draft status 2A-S. Courses include physical metallurgy, electrometallurgy, heat treatment, thermodynamics, metallography of cast metals and foundry technology. Member of Tau Beta Pi, A.I.Ch.E., and A.F.S. Foundry Educational Foundation Scholarship. Experience as co-operative student in brass foundry and physical metallurgy laboratory, four years. Desires industrial production work, ferrous or brass. No regional preference. Available June 7.



Colorado School of Mines

William D. Brown

Degree Expected: Met. Engr.

School Address: 22 Prospector Park, Golden, Colo.
Home Address: 8455 W. Rivershore Dr., Niagara Falls, N. Y.

Age 26, married, one child; draft status 5A, vet, no service connections. Courses include ore dressing, nonferrous production, metallurgy of iron and steel, assaying and pyrometallurgy, hydrometallurgy, metallography, practical spectrography, met. thermodynamics, physical met., phys. chem. Experience as laborer in nonferrous foundry and steel construction. Desires nonferrous foundry work, nonferrous production, or mineral dressing. East or Midwest preferred but not essential. Available June 23.

Charles G. Massieon

Degree Expected: Met. Engr.

School Address: Box 49, Golden, Colo.
Home Address: 2801 5th St., Peru, Ill.

Age 21, single; 4F draft status. Major is metallurgy. Courses include production metallurgy, physical metallurgy, ore dressing, thermodynamics, X-ray diffraction, and other prescribed courses. Desires work with alloys and physical metallurgy. Midwest or East. Available July.

Craig O. Malin

Degree Expected: Met. Engr.

School Address: 1418 Ford St., Golden, Colo.
Home Address: 685 Durant Ave., San Leandro, Calif.

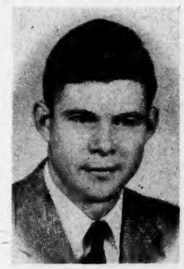
Age 21, single. Courses include basic sciences as chemistry, physics, thermodynamics, mathematics, descriptive geometry. Other courses include civil engineering, English, economics, electrical engineering, geology, mining. Metallurgical courses include nonferrous production metallurgy, fuels, assaying, mineral dressing, hydrometallurgy and electrometallurgy, metallography, spectrography, metallurgical design, physical metallurgy, metallurgy of iron and steel. Prefers production, development, or control work. Western territory preferred but not essential. Available June 1.

Lawrence C. Simmons

Degree Expected: Met. Engr.

School Address: 1020 13th St., Golden, Colo.
Home Address: Same

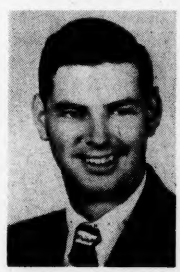
Age 26, married, two children; draft status 5A. Courses includes nonferrous metallurgy, ferrous metallurgy, mineral dressing, hydro & electrometallurgy, metallography, spectrography, met. design, industrial relations, metallurgy of rare metals, met. thermodynamics and fuels. West area, preferably Northwest. Available June.



Wilfred A. Slader

Degree Expected: Met. Engr.

School Address: Box 332, Golden, Colo.
Home Address: Box 28, Millwood, N. Y.



Age 25, married, no children; veteran, Lt. in Colorado National Guard. Winner of an ASARCO scholarship in metallurgy 1951-52. Subjects include metallurgy of iron and steel, economics and combustion of fuels, physical chemistry, physical metallurgy, spectroscopy and chemical thermodynamics. Desires iron or steel production work. Prefers region around Pennsylvania or New York; second choice anywhere east of Mississippi River. Available first week in July.

Victor R. Spironello

Degree Expected: Met. Engr.

School Address: 53 Prospector Park, Golden, Colo.
Home Address: 230 62nd St., Niagara Falls, N. Y.

Age 28, married, classified 5A. Iron and steel production metallurgy. ASARCO cash scholarship, senior year. No industrial experience along ferrous line. Research and development or production, both in ferrous, desired. Any location where graduate work is possible. Available June 1.

FOR FURTHER INFORMATION about these graduates
Write direct to student or to head of metallurgy department or placement bureau at the school. *See list on pages 19 and 20.*

Colorado (Cont.)

Vernon R. Thompson
Degree Expected: Met. Engr.
School Address: 1404 Maple St., Golden, Colo.
Home Address: 2933 Wyandot St., Denver, Colo.

Age 22, single; draft classification 2A(5). Subjects include general metallurgy, nonferrous metallurgy, assaying, mineral dressing, hydrometallurgy, industrial minerals, ferrous metallurgy, physical chemistry, spectrography, metallography, and physica metallurgy. Prefers work in physical metallurgy. West or Far West. Available June 1.

Columbia University

Robert Bakish
Degree Expected: B. S. in Met. Eng.
School Address: 108-07 65th Rd., Forest Hills, New York 75, N. Y.
Home Address: Same

Age 25, single; draft status 2S. First two years P. I. Brooklyn. Courses include physical chemistry, ferrous, physical, mechanical metallurgy, metallography, X-ray crystallography. "Krumb Scholar" 1950-51, 1951-52. School orchestra; chairman, student council, school of engineering. Research assistant in School of Mines since summer 1950. Work in martensite transformation in Cu-Sn alloys. Knowledge of languages. Prefers research work with high-temperature alloys. New York and Eastern States preferred. Available June.

John Joseph Gilman
Degree Expected: Ph. D.
School Address: Room 607, School of Mines, Columbia University, New York, N. Y.
Home Address: 417 Riverside Dr., New York, N. Y.

Age 26, married, veteran, inactive Ensign U.S.N.R. Major was metal physics. B.S. in mechanical engineering. Four years experience research lab. of Crucible Steel Co. X-ray diffraction, mechanical testing, expert metallographer, etc. Author nine papers; four on sigma phase steels; five on zinc crystals. Tau Beta Pi, Pi Tau Sigma, Phi Lambda Upsilon, Sigma Xi, Campbell Fellow 1949-1950, Columbia University. Interested in design and research. Any location. Available September.

John W. Semmel, Jr.
Degree Expected: M. S. in Met.
School Address: 525 W. 113th St., New York 27, N. Y.
Home Address: 1452 East 57th St., Brooklyn 10, N. Y.

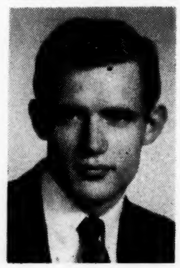
Age 25, married; veteran, draft status 4A. Courses include metallography, physical and extractive metallurgy, X-ray diffraction and crystal structure, mechanical metallurgy, physical metallurgical thermodynamics, physical chemistry and statistics. Member Tau Beta Pi. Columbia scholarships, Higgins' Fellow. Two summers research on the martensitic transformation for Atomic Energy Commission at Columbia. Prefers physical metallurgical research and development in ferrous or Al, Cu, Ti industry. East preferred. Available June.

Cornell University

James Roger Baum
Degree Expected: B. M. E.
School Address: 313 Farm St., Ithaca, N. Y.
Home Address: 1231 Fairview Dr., Kent, Ohio

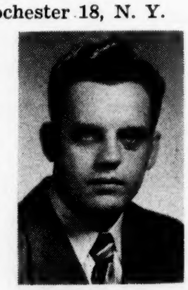
Age 22, single; Naval Reserve Officer's Training Corps, 1D. Courses include engineering materials, physical properties of materials, heat transfer, advanced temperature measurement. Major in industrial engineering. Senior Project: "A Statistical Investigation of the Effect of Various Surface Factors on the Fatigue Properties of Roller Chain." Tau Beta Pi, Tau Sigma. Employed in material's laboratory of Morse Chain Co. Interested in research and development with company producing metallurgical or heat treating equipment.

Charles H. Moore, Jr.
Degree Expected: B. M. E.
School Address: 608 Harshaw Rd., Ithaca, N. Y.
Home Address: Same



Age 22, married, one child; draft status 3A. Fifth year project consists of series of pressure tests on elliptical covers with idea of improved design and new pressure ratings. Senior course in applied physical metallurgy. Holder of McMullen Scholarship. Co-captain of track team, asst. coach fifth year. Summer experience in pressure vessel accessory plant. Desires industrial work in production or sales. Any location. Available July 1.

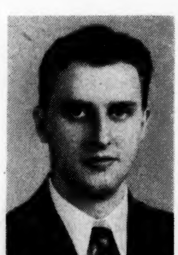
Donald A. Schreiner
Degree Expected: 5-Year B. M. E.
School Address: 614 Stewart Ave., Ithaca, N. Y.
Home Address: 2757 Monroe Ave., Rochester 18, N. Y.



Age 23, single. 2nd Lt. Ord. Reserve upon graduation. Major study in industrial engineering. Courses include production control, standard costs, time and motion study, production economy. Minor study in machine design. Work on fifth year project covering the design and production of a small centrifugal water pump. Desires position in industrial or production engineering. New York State preferred but not essential. Available June 10.

Drexel Institute of Technology

Louis F. Calzi
Degree Expected: B. Sc. in Met. Eng. (*Co-op*)
School Address: 6162 N. 17th St., Philadelphia 41, Pa.
Home Address: Same



Age 28, single; draft status 5A. Courses include physical metallurgy and physical chemistry, process and foundry metallurgy, heat transfer, statistics, and economics. Tau Beta Pi. President of A.S.M. group at Drexel. Feature writer on school's technical magazine. Worked under cooperative plan as draftsman, laboratory technician, and student aide in a research laboratory. Prefers research in thermal ferrous metallurgy or sales engineering. East preferred but not essential. Available June 16.

Drexel (Cont.)

Lee Joseph Cuddy

Degree Expected: B. S. in Met. Eng.

School Address: 4418 Aldme St., Philadelphia 36, Pa.
Home Address: Same

Age 22, single; draft status 4F. Courses include all subjects prescribed for degree in metallurgical engineering. Honors, Tau Beta Pi. Extracurricular, Secretary A.S.M. Experience: foundry laborer; met. engineering aide, pilot plant operator (chemical); chem lab assistant; testing lab experience. Interested in field application and development of (new) processes. Midwest preferred but not essential. Available end of June.

Lewis J. Gerlach, Jr.

Degree Expected: B. S. in Met. Eng.

School Address: County Court Apt. C-1, Media, Pa.
Home Address: Same

Age 23, married. Presently in Army R.O.T.C. at Drexel and plans to serve in the reserve component of the Ordnance Corps. Senior subjects include process metallurgy, foundry metallurgy, plastic shaping of metals, and corrosion and heat resistance of alloys. Co-capt. football, 1950; vice-president of Blue Key, 1951; president of Men's Athletic Association Council, 1951. Co-op work in oil refinery. Corrosion work in oil refinery operations. Philadelphia preferred. Available June 16.

John R. Wiese

Degree Expected: B. S. in Met. Eng.

School Address: 3156 Jasper St., Philadelphia 34, Pa.
Home Address: Same

Age 22, single; draft status 1D. Courses include physical metallurgy and chemistry, welding and radiography, process metallurgy, foundry metallurgy, corrosive and heat resistant alloys, heat transfer, and allied subjects. Member of social, service, and honorary fraternities, and Student Technical Society. Co-operative jobs in nonferrous and ferrous foundries, in research and testing capacity. Semi-Thesis: High-Aluminum-Killed Steel. Desires producing industry or research, ferrous. East preferred. Availability undetermined due to draft status.

Grove City College

C. Richard Baechtel

Degree Expected: B. S. in Applied Sci., M. E. Major

School Address: Box 163, Memorial Hall, Grove City, Pa.
Home Address: 2505 Wilson St., Natrona Heights, Pa.

Age 23, single; draft status 4A. veteran. Mechanical engineering major. Courses in metallurgy include ferrous metallurgy, physical metallurgy, and heat treatment of steel. Also courses in a.c. and d.c. machinery. President of metallurgy club in senior year. Completed Navy 42-week electronic technicians course. Experience as electric furnace observer. Prefers development or production in steel or Ti. Eastern U. S. preferred, but will consider other locations. Available June 15.

Richard J. Herdzik

Degree Expected: B. S. in Met. Eng.

School Address: 361 South Hall, Grove City College, Grove City, Pa.
Home Address: 601 Grant St., Franklin, Pa.

Age 22, single; 2A-S draft status. Courses include physical metallurgy, metallography, physical chemistry, thermodynamics, ferrous metallurgy, strength of materials. Worked summers in steel industry and machine company in heat treating capacity. Metallurgical laboratory assistant while attending college. Prefers research or ferrous production work. Eastern location. Available June 16.

Joseph A. Mallison

Degree Expected: B. S. in Applied Sci., Mech. Eng. Major

School Address: Box 163, Grove City College, Grove City, Pa.
Home Address: 32 Mark St., St. Marys, Pa.

Age 24, single. Veteran, inactive Naval Reserve. Courses include algebra, trig., calculus, differential equations, physical and ferrous met., heat treatment, strength of materials, steam power engineering, basic mechanisms, and electricity. Naval Aviation Machinist school, class A. Summer work in maintenance. Prefers work in maintenance section of manufacturing plant. Any location. Available immediately.

Robert H. Miller

Degree Expected: B. S. in Mech. Eng.

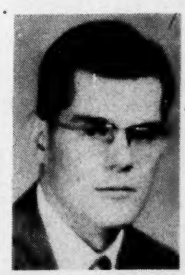
School Address: 218 South Center St., Grove City, Pa.
Home Address: Same

Age 24, married; 4A draft status. Courses include general mechanical engineering courses, public speaking, psychology, and philosophy. A graduate of General Electric Technical Night School (Engineering). Five years industrial experience, 3½ years as apprentice machinist, with General Electric Co. Prefers production, planning, or personnel work. East, Midwest preferred. Available June 9.

William K. Mong

Degree Expected: B. S.

School Address: R.D. 2, Kennerdell, Pa.
Home Address: Same



Age 24, single; draft status 4A. Courses include engineering drawing, statics, dynamics, thermodynamics, basic mechanisms, internal combustion engines, steam power engineering, refrigeration—air conditioning, hydraulics, strength of materials, d.c. and a.c. machinery, ferrous metallurgy, physical metallurgy, heat treatment. Metallurgy Club. Prefers manufacturing industry. Eastern location. Available June.

FOR FURTHER INFORMATION about these graduates
Write direct to student or to head of metallurgy department or placement bureau at the school. *See list on pages 19 and 20.*

Grove City (Cont.)

Eugene L. O'Donnell
Degree Expected: B. S. in Mech. Eng.

School Address: 111 St. Marys St., Butler, Pa.
Home Address: Same

Age 25, married, one child; veteran. Courses include ferrous metallurgy, physical metallurgy, heat treatment, general chemistry, thermodynamics, strength of materials, engineering drawing, manufacturing processes, steam power engineering, a.c. and d.c. electrical machinery; industrial management. Experience as a construction worker in railroad car manufacturing industry, timekeeper and foreman's assistant on highway construction work. Prefers manufacturing or industrial work. No geographical preference. Available February.

George M. Schenck
Degree Expected: B. S. in Mech. Eng.

School Address: 712 South Center St., Grove City, Pa.
Home Address: Mounted Route 10, Butler, Pa.

Age 23, single; draft status 2A. Math. major. Basic mechanical engineering courses leading to B.S. degree; assorted metallurgical engineering courses. Experience: assistant in shop and physics labs. Work preferred is engineering in field of construction. Available July 1.

Illinois Institute of Technology

Paul A. Bergman
Degree Expected: B. S. in Met.

School Address: 5043 So. Western Blvd., Chicago, Ill.
Home Address: Same

Age 21, single. School courses cover ferrous and nonferrous metals (heat treating, age hardening, foundry, nonferrous physical met.). Worked in an iron foundry during summer. Prefers producing industry or research with nonferrous metals. Chicago area preferred but not essential. Available June.

Edward M. Grala
Degree Expected: B. S. in Met. Eng.

School Address: 8531 Burley Ave., Chicago 17, Ill.
Home Address: Same

Age 22, single; 2A(S) draft status. Courses include physical metallurgy, metallography, crystallography and X-ray diffraction analysis, metallurgical process principles, extractive metallurgy, heat treatment of steels, nonferrous production metallurgy, physical chemistry. Worked in a steel treating plant during past summer. Desires foundry, ferrous or nonferrous; production work or sales. No location preference. Available June 20.

Donald N. Guy
Degree Expected: B. S. in Met. Eng.

School Address: 711 S. Humphrey Ave., Oak Park, Ill.
Home Address: Same

Age 21, single; 2A draft status. Regular met eng. course, no option, majority of electives in chemistry. Prefers production or development work, nonferrous. Chicago or Midwest location preferred. Available August.

Ernest E. Haack
Degree Expected: B. S. in Met. Eng.

School Address: 2430 E. 107th St., Chicago, Ill.
Home Address: Same

Age 26, married, one child; 4A draft status, inactive reserve. Courses include general metallurgical engineering subjects. Naval aviator (Ensign). Cooperative student 1½ years in steel foundry research laboratory. Some summer work in steel mill. Part time work as retail salesman, automotive equipment. Desires sales or production work, ferrous or nonferrous, any location. Available June 13.

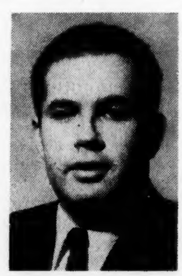
Leslie C. Hymes
Degree Expected: B. S. in Met. Eng.

School Address: 7732 S. Wood St., Chicago 20, Ill.
Home Address: Same

Age 20, single; draft status 1D. Organized Navy Air Reserve. Courses include physical metallurgy, unit operations, foundry, physical chemistry. President of Triangle Fraternity; Secretary Pi Delta Epsilon honorary journalism; business manager of school yearbook and weekly newspaper; listed in Who's Who in American Colleges and Universities. Worked two summers as an observer in an openhearth. Desire work in sales or development in ferrous metals industry. Midwest to West preferred but not essential. Available July 1.

Leonard Raymond Kohan
Degree Expected: B. S. in Met. Eng.

School Address: 1065 Thorndale Ave., Chicago 40, Ill.
Home Address: Same



Age 21, single; draft status 1D. Illinois National Guard. General courses in metallurgy and other related engineering courses. Member Board of Governors of student affiliate of A.S.M. Sports editor of school newspaper, also yearbook. Freshman scholarship. Desires production or management, preferably in Chicago area. Available September.

FOR FURTHER INFORMATION about these graduates
Write direct to student or to head of metallurgy department or placement bureau at the school. See list on pages 19 and 20.

Illinois Tech (Cont.)

Norbert R. Kurtz

Degree Expected: B. S. in Met. Eng.

School Address: 512 S. Clarence Ave., Oak Park, Ill.
Home Address: Same

Age 24, married; 2A draft status. Attended St. Mary's College, Winona, Minn. 2½ years. Courses include many liberal studies, ferrous and nonferrous metallurgy, physical metallurgy, structure of metals, physical chemistry, and strength of materials. One year teaching in high school plus part time and summer work as machinist and office help. Desires development work. Southwest or West preferred but not essential. Available June.

Ralph H. Lockhart

Degree Expected: B. S. in Met. Eng.

School Address: 7737 South May St., Chicago, Ill.
Home Address: Same

Age 21, single; draft status 1A. Senior courses include heat treatment of steels, physical metallurgy, nonferrous alloys. Prefers producing industry or industrial work with nonferrous alloys. Midwestern states preferred but not essential. Available in summer.

Walter John Myers

Degree Expected: B. S. in Met. Eng.

School Address: 4821 Fletcher St., Chicago 41, Ill.
Home Address: Same

Age 24, single; draft status 4A. Courses include physics of metals, metallurgical calculations, heat treatment, metallurgy of iron and steel, nonferrous metallurgy, shop course in foundry, metallography. Worked in heat treatment of steels. Prefers production or process development. No territory preference. Available February 20.

John J. Rausch

Degree Expected: B. S. in Met. Eng.

School Address: 6033 N. Paulina, Chicago, Ill.
Home Address: Same

Age 20, single; 2A draft status. Courses include physical chemistry, physical metallurgy, metallurgical calculations, and management electives. Experience includes work in metallurgical and chemical laboratories. Vice-president of metallurgical society. Prefers production or process development work. Any location including foreign. Available July 1.

FOR FURTHER INFORMATION about these graduates
Write direct to student or to head of metallurgy department or placement bureau at the school. See list on pages 19 and 20.

Joseph F. Sisti

Degree Expected: B. S. in Met. Eng.

School Address: Room 308, Fowler Hall, 3200 So. Michigan Ave., Chicago 16, Ill.
Home Address: 1524 Ridge Ave., Rockford, Ill.

Age 24, single; inactive Naval Reserve; draft status 2A-S. Courses include physical metallurgy metallurgical process principles, extractive metallurgy, metallurgical engineering operations and structure of metals, machine design, strength of materials. Member of school glee club. Co-op student; three years actual practical experience in producing industry. Work included control of heat treated parts, inspection of incoming material, considerable metallography, investigation of customer complaints, and some development work. Prefers work in producing or development industry. No territorial preference. Available June.

University of Illinois

Joseph Borrino

Degree Expected: B. S. in Met. Eng.

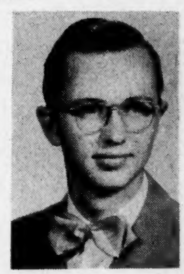
School Address: B-69 Stadium Terrace, Champaign, Ill.
Home Address: 2852 N. Neva Ave., Chicago 34, Ill.

Age 30, married, veteran. Courses include metallurgy and metallography of ferrous and nonferrous metals, alloy steels, metallurgy of deep drawing, physical metallurgy and laboratory practice, physical chemistry, and pyrometry. Worked part time at university as laboratory assistant for Rails Investigation doing metallographic work and physical testing of materials. Experience includes three years as combination welder, five years as metalsmith in U. S. Navy. Desires ferrous poducing industry or research. Midwest preferred. Available June.

Richard Johnston McClintick

Degree Expected: B. S. in Met. Eng.

School Address: 126 W. Clark St., Champaign, Ill.
Home Address: 404 Peoria Ave., Peoria, Ill.



Age 23, married, one child; 3A draft status. Courses include all prescribed met. eng. subjects and principes of economics, welding and heat treatment, surveying, and manufacturing processes. Membership in Alpha Sigma Mu, honorary met. fraternity; vice-president of student professional society. Worked two years in metallurgical lab of Caterpillar Tractor Co. Desires industrial or research, ferrous metals. No location preference. Available June.

Vito V. Mitkus

Degree Expected: B. S. in Met. Eng.

School Address: 241—1B-Ct. A. Pgu., Champaign, Ill.
Home Address: 7126 South Artesian Ave., Chicago 29, Ill.

Age 23, single; draft status 4A. Courses include a good background in liberal arts and sciences in addition to physical met., met. calculations, ferrous and nonferrous production, electrometallurgy, metallography, alloy steels, advanced physical met., resistance of materials, and chemistry courses including organic chemistry. Member of the Mineral Industries Society. Summer work in foundry research. Prefers ferrous producing or foundry in Chicago. Available August.

Illinois (Cont.)

Sherwood W. McGee

Degree Expected: B. S. in Met. Eng.

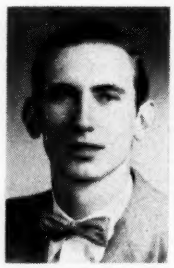
School Address: 1206 West Oregon St., Champaign, Ill.
Home Address: 7505 So. Dorchester Ave., Chicago 19, Ill.

Age 24, single; 4A draft classification. Courses include ferrous and nonferrous metallography and production metallurgy, advanced physical testing, heat treatment laboratory, and minor in chemistry. 33 months work as research technician on fabrication and high vacuum casting of high purity metals; one summer in openhearth department. Prefers producing industry or industrial research. Location convenient to a night school.

Joseph Melill

Degree Expected: B. S. in Met. Eng.

School Address: 1601 S. Neil, Champaign, Ill.
Home Address: Same



Age 24, married, no children; veteran. Courses include ferrous and nonferrous physical metallurgy, physical chemistry, pyrometry, powder metallurgy, heat treating practice and control. Student assistant on an "Investigation of Lead Sheath Materials" at the University. Desires nonferrous producing industry, sales, or research. Any location. Available June.

Harvey Bernard Nudelman

Degree Expected: B. S. in Met. Eng.

School Address: 121—2—Court A, Champaign, Ill.
Home Address: 6014 N. Francisco, Chicago 45, Ill.

Age 22, single; 2A draft status. Courses include ferrous and nonferrous metallography and metallurgy, electrometallurgy, physical metallurgy, alloy steels, advanced physical metallurgy laboratory, physical chemistry, materials testing laboratory, pyrometry, metallurgy of deep drawing and pressing, metallurgical calculations. Tau Beta Pi, Alpha Sigma Mu. Desires product development, research or production in physical metallurgy. Midwest preferred but not essential. Available February 12.

Alvin David Shulman

Degree Expected: B. S. in Met. Eng.

School Address: 508 E. Green St., Champaign, Ill.
Home Address: 304 W. Chestnut, Fairbury, Ill.

Age 21, single; draft status 2A until June 1, 1952. Courses in ferrous and nonferrous processes, metallography, and heat treating, electromet., alloy steels, and steel castings. Member of Mineral Industries Society. Desires work in producing or consuming industry, particularly interested in secondary metal processing. Chicago area preferred, but not essential. Available July.

James T. Stanley

Degree Expected: B. S. in Met. Eng.

School Address: 1617 W. Clark St., Champaign, Ill.
Home Address: Same

Age 22, single; 1A draft status. Member organized reserves (Naval-CSA) subject to call in June. Courses include ferrous and nonferrous metallography, alloy steels, physical metallurgy, seminar and thesis. Member of Tau Beta Pi honorary and Engineering Council. Desires research or development work. Location not important. Available June 5.

University of Idaho

Glen E. Hanson

Degree Expected: B. S. in Met. Eng.

School Address: 730 Deakin Ave., Moscow, Idaho
Home Address: 672 Ninth St., Idaho Falls, Idaho

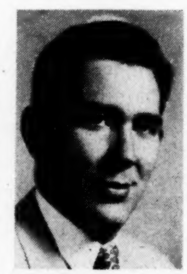
Age 26, single; 4A status. Courses include physical, nonferrous, and ferrous metallurgy, mineral dressing, fire and wet assaying, metallurgical calculations. Who's Who in American Colleges and Universities, Sigma Gamma Epsilon. Extensive underground experience. Desires nonferrous metals producing or consuming industry, preferably aluminum or copper. No territorial preference. Available June 15.

Lafayette College

George Wm. Frehafer

Degree Expected: B. S. in Met. Eng.

School Address: 17 Sullivan Village, Easton, Pa.
Home Address: 324 S. Lakeview Dr., Sebring, Fla.



Age 30, married, one child. Veteran. Subjects include physical metallurgy, physical chemistry, metallurgy of iron and steel, nonferrous metallurgy, metallurgical thermodynamics, powder metallurgy, light metals, mineral dressing. Worked one year Warren Foundry & Pipe Corp., on cupola, casting pit, and machine shop. One summer arc welder for Easton Car & Construction Co. Desires ferrous production. Midwest or East. Available June 9.

Paul Krieger

Degree Expected: B. S. in Met. Eng.

School Address: Lafayette College, P.O. Box 266, Easton, Pa.
Home Address: Av. Pres. Vargas 417-A Sala 1109, Rio de Janeiro, Brasil, S. A.

Age 21, single, no draft status. Studied physical metallurgy, metallurgical engineering, physical chemistry, metallurgy of iron and steel, materials testing, nonferrous metallurgy, metallurgical thermodynamics, mineral dressing, advanced physical metallurgy, advanced foundry, light metals. No previous work experience. Interested in working in U. S. for one year to get some experience in the production of iron and steel and foundry and becoming representative of American firm in Brazil. Available June 15.

Lafayette (Cont.)

Joseph Edwin Parnell

Degree Expected: B. S. in Met. Eng.

School Address: Delta Tau Delta Fraternity, Lafayette College, Easton, Pa.

Home Address: 599 Washington St., Indiana, Pa.

Age 22, single, 2nd Lt. in Reserves. Tau Beta Pi. Courses include ferrous and nonferrous metallurgy, physical metallurgy, powder metallurgy, mineral dressing, physical chemistry, and other related subjects. Desires work in producing or consuming industry, ferrous or nonferrous. Eastern part of country preferred, but not essential. Available June.

Stanley Allen Woolbert

Degree Expected: B. S. in Met. Eng.

School Address: 100 March Village, Easton, Pa.

Home Address: 177 Elizabeth St., East Stroudsburg, Pa.

Age 21, married; draft status 2S. Subjects: All metallurgy courses required for degree. Includes ferrous and nonferrous, advanced physical met., powder met., light metals, physical chemistry, geology, mineral dressing. Activities: mining and metallurgy societies. Summer work with publishing company and transportation company. Prefers production industry or industrial work in ferrous or aluminum. East or Midwest preferred but not essential. Available June 16.

Edward O. Woolridge

Degree Expected: B. S. in Met. Eng.

School Address: Kappa Delta Rho, Lafayette College, Easton, Pa.

Home Address: 17 W. Third Ave., S., Clearfield, Pa.

Age 21, single; draft status 2A(S). Courses include physical metallurgy (general and ferrous), nonferrous metallurgy, powder metallurgy, metallurgy of iron and steel, metallurgical thermodynamics, metallurgy of light metals, physical chemistry. Vice-president of metallurgical society. Desires production work in East. Available July 1.

Laval University

Paul E. Fortin

Degree Expected: B. S. in Met. Eng.

School Address: 33 Garnier St., Quebec, P.Q., Canada

Home Address: Val Jalbert, Cte Roberval, P.Q., Canada

Age 27, single. B.A. degree (1947). Courses include metallography, X-ray analysis, refractories, heat treatment, electrometallurgy, ore dressing, corrosion, metallurgy of Cu, Ag, Au, Zn, Pb, Fe; physical chemistry, thermodynamics, design. Speaks French and English. Member of C.I.M.M. and E.I.C. Holds Mines Department scholarship (1950-51; 1951-52). Summer experience in gold cyanidation, mineral dressing, titanium oxide smelting, iron refining, sampling and testing. Research or production, preferably in titanium, zinc or ferrous plant. Any location. Available May 15.

Jean J. Lamarche

Degree Expected: B. S. in Met. Eng.

School Address: 129 Garnier St., Quebec, P.Q., Canada

Home Address: Box 103, Mont-Laurier City, P.Q., Canada

Age 27, single, B.A. from Laval University 1946. Student member C.I.M.M., E.I.C. Courses include engineering materials and processes, physical metallurgy, X-ray analysis, metallography, heat treatment, extractive metallurgy, ore dressing, physical chemistry, thermodynamics, resistance of materials, electrical units, economics. Languages spoken and written: French and English. Language written: Spanish. Four summers of work in ore dressing of copper and zinc. Quebec Department of Mines Scholarship 1951-52. Desires extractive metallurgical industry. Any location. Available May.

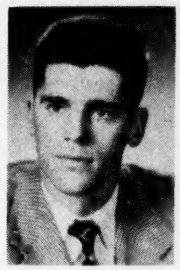
Lehigh University

George R. Gigon

Degree Expected: B. S. in Met.

School Address: 515 Delaware Ave., Bethlehem, Pa.

Home Address: 14 Asbury St., New Milford, N. J.



Age 21, single, draft status 2A-s. Courses include physical metallurgy, electrometallurgy, ferrous and nonferrous metallurgy, quantitative and qualitative analysis, physical chemistry, German, mineralogy and physical geology. Summer experience in iron foundry; production of gray castings. Desires technical sales or nonferrous production. No preference in location. Available June 15.

William Gowder

Degree Expected: B. S. in Met. Eng.

School Address: 1944 Brookside Dr., Bethlehem, Pa.

Home Address: 1028 Edgehill Rd., Roslyn, Pa.

Age 26, married, two children; 5A draft status. Courses include ferrous and nonferrous production metallurgy, physical metallurgy, metallography, electrochemistry and electrometallurgy, physical chemistry. Worked two years as metallurgical laboratory technician. Prefers precision manufacturing or industrial work with ferrous metals. East preferred but not essential. Available June 23.

William Q. Judge

Degree Expected: B. S. in Met. Eng.

School Address: Taylor Hall C, Lehigh University, Bethlehem, Pa.

Home Address: 1028 Edgehill Rd., Roslyn, Pa.

Age 24, single, veteran. Courses include two semesters iron and steel, physical metallurgy, metallography, electrometallurgy; two semesters physical chemistry; two semesters nonferrous metallurgy, labor problems. Served as dormitory section president and freshman counselor. Prefers work in production metallurgical problems or producing ferrous industry. Any location. Available July 1.

Lehigh (Cont.)

James H. Lovell, Jr.
Degree Expected: B. S. in Met. Eng.
School Address: 805 Delaware Ave., Bethlehem, Pa.
Home Address: 133 Short Hills Ave., Springfield, N. J.

Age 23, single; draft status 4A. Subjects include advanced iron and steel metallurgy and a sound background of nonferrous and electrometallurgy. Interested in fer process metallurgy, metal fabrication, and electrometallurgy. Some experience during summer as foreman in production. Desires work of development, production or sales nature. East or South preferred but not essential. Available July 1.

University of Maryland

Mel M. Schwartz
Degree Expected: M. S. in Met. Eng.
School Address: 4607 Knox Rd., College Park, Md.
Home Address: 5755 Addison St., Philadelphia 43, Pa.

Age 22, single; draft status 1A. Holds B.A. in metallurgy from Temple University. Courses include ferrous and nonferrous metallurgy, physical metallurgy, ferrous and nonferrous metallography, physical chemistry, heat treatment and metallurgical measurements, X-rays and advanced physical laboratory. Working for Bureau of Mines in Recovery of Secondary Metals Research Section. Eastern location around Baltimore and Washington preferred. Available immediately.

McGill University

Pauls Eriks Golubovskis
Degree Expected: B. Eng. in Met. Eng.
School Address: 4266 Old Orchard Ave., Apt. 19, Montreal, Canada
Home Address: Same

Age 24, single, Latvian D.P. Courses include extractive and physical metallurgy, electrometallurgy, metallurgical problems and design and mineral dressing. Summer employment with a lead plant in Germany and with coke oven and blast furnace departments of Steel Co. of Canada. Desires industrial work or research. Canada and Latin America preferred but not essential. Available May.

Roy Griffiths
Degree Expected: B. Eng. (Metallurgy)
School Address: 5574 Bannantyne Ave., Verdun, Que., Canada
Home Address: Same

Age 32, single; veteran, five years in Canadian air force. Courses include physical and extractive metallurgy, thermodynamics, electrometallurgy, mineral dressing, electrical engineering, metallography, mineralogy. Thesis: Electrical Conductivity of Iron-Lime-Silica Slags. Design problem on copper anode furnace. Summer experience in cast iron foundry. Desires nonferrous production. Location preferably West or Southwest. Available July 1.

Gordon James Hood
Degree Expected: B. Eng.
School Address: 3512 Walkley Ave., Montreal, Que., Canada
Home Address: Same

Age 25, single. General B. Sc. McGill University, continuing in math and physics. Engineering courses include ferrous and nonferrous production metallurgy, physical metallurgy, heat flow and electrometallurgy, physical chemistry, electrical engineering, accounting and reports. Summer experience as openhearth observer. Desires producing industry or plant work. Willing to travel, States or South America. Available August 1.

Jean Guy Montpetit
Degree Expected: B. Eng. in Met. Eng.
School Address: 8425-A St. Denis St., Montreal 10, Que. Canada
Home Address: Same

Age 22, single. Courses include extractive and advanced metallurgy with problems and design, electrometallurgy, metallography, thesis, advanced physical chemistry, and mineral dressing. Bilingual, French-English. Summer experience (16 months) in Canadian metallurgical plants. Prefers development engineering in extractive metallurgy field. Province of Quebec preferred but not essential. Available June 1.

Massachusetts Institute of Technology

William H. Ferguson, Jr.
Degree Expected: B. S. in Met. Eng.
School Address: 257 Westgate West, Cambridge, Mass.
Home Address: Rt. 12, Box 297, Fort Worth, Tex.

Age 25, married; veteran, Ordnance Dept. Active Reserve. Major course of study mineral engineering; minor studies are physical and crystallographic geology, extractive, process and physical metallurgy. A.I.M.E. scholarship. Extra-curricula activities include student experimental foundry, American Ordnance Assoc., president of company National Soc. of Scabbard and Blade, rifle and pistol teams. Industrial experience as locomotive fireman, geo-chemical and mineral dressing laboratory assistant; summer work as student engineer in charge of abrasive recovery for stone cutting concern. West of Mississippi. Available July.

Charles G. Fletcher
Degree Expected: B. S. in Mech. Eng.
School Address: Box 364 Main St., Wellfleet, Mass.
Home Address: Same

Age 24, single, veteran. Courses include engineering metals, metal processing, mechanical behavior of metals, and principles of metal cutting. Worked summers as a salesman and as a transitman on highway construction. No territory preference. Available June 15.

Michigan College of Mining and Technology

Robert Gerald Grant

Degree Expected: B. Eng. in Met. Eng.

School Address: 1405 College Ave., Houghton, Mich.
Home Address: 631 Fisher Rd., Grosse Pointe 30, Mich.

Age 20, single; draft status 2S. Courses include process metallurgy, advanced physical metallurgy, applied heat treatment, alloy steels, protective coatings, furnace design, instrumentation, foundry, powder metallurgy, thermal analysis. Seminar subject: Self-Diffusion in Metals. Research on "brightening agents" as student assistant in protective coatings and "tin-nickel alloy deposition" as undergraduate problem. Yearbook, newspaper, honorary fraternity, treasurer of national professional engineering fraternity. Desires research or production, ferrous or light metals. Midwest, preferably Detroit area. Available March 22.

James Robert Lindgren

Degree Expected: B. S. in Met. Eng.

School Address: 903 Jasper, Houghton, Mich.
Home Address: Box 68, Toivola, Mich.

Age 21, single; draft status 4D. Courses include foundry and foundry practice, metallurgical calculations, physical chemistry, principles of economics, nonferrous and ferrous metallurgy, internal combustion engines, welding metallurgy, metallography and R.O.T.C. Desires producing or consuming industry. No location preference. Available July 1.

Nelson L. McRoberts

Degree Expected: B. S. in Met. Eng.

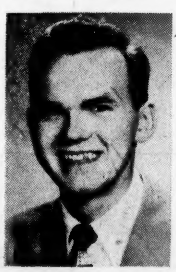
School Address: 1405 College Ave., Houghton, Mich.
Home Address: 20050 Baltree Ct., Detroit 30, Mich.

Age 21, single; 2A(s) draft status. Courses include heat treat, foundry, process and physical metallurgy and metallography, protective coatings, electrometallurgy, alloys, business law, pyrometry, calculations, X-rays, undergraduate problem in alloy electrodeposition. Member of four fraternities both professional and honorary, and president of two of these. Who's Who in American Colleges & Universities. Summer experience in industrial electroplating. Desire industrial or research work in electroplating, heat treat or foundry. Detroit area preferred. Available middle of April.

Robert Clarke Stanley

Degree Expected: B. S. in Met. Eng.

School Address: 1111 Jasper St., Houghton, Mich.
Home Address: 435 Madison Ave., Birmingham, Mich.

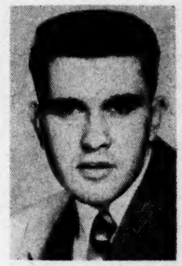


Age 23, single; veteran, draft status 4A. Thesis: Nucleation of Spheroidal Graphite in Ductile Irons. (Also paper on gray iron inoculation.) Business manager of college newspaper; member of Tau Beta Pi and Delta Sigma Phi. Summer experience as milling machine operator, heat treat hardener, and foundry laborer. Learned general foundry operations by actual work as floor helper. Desires work in foundry industry, preferably in northern section of the country. Available March.

Harry Suprinick

Degree Expected: B. S. in Met. Eng.

School Address: 1415 College Ave., Houghton, Mich.
Home Address: 69 Melrose St., Brooklyn 6, N. Y.



Age 23, single; draft status, 4F. B.S. mechanical engineering, M.C.M. &T., 1950. Courses include physical metallurgy, physical chemistry, pyrometry, foundry technology, furnace operations, process metallurgy, alloy steels, heat treatment. Senior paper: Metallurgical Factors Governing Helical Spring Design. Approx. 4 years in tool and die industry. Student assistant, dept. of mech. eng., 1951-52. Employment desired to combine mechanical and metallurgical engineering. Northeast desired but not essential. Available April 22.

Michigan State College

Shingo Inouye

Degree Expected: B. S.

School Address: 227 Abbot Hall, E. Lansing Mich.
Home Address: 7271 Fielding, Detroit 28, Mich.

Age 24, single; veteran, draft status 4A. Courses include powder metallurgy, advanced physical metallurgy, heat treating practice and control, pyrometry, electroplating, spectroscopy, foundry technology. Summer work in sand research for steel casting company. Desires development work or producing industry. Ferrous metals preferred. Midwest preferred but not essential. Available June.

Joe H. King

Degree Expected: B. S. in Met. Eng.

School Address: 725 E. Park Terrace, Lansing, Mich.
Home Address: Same

Age 24, single, veteran. Subjects studied include principles of physical metallurgy, ferrous and nonferrous physical met., ferrous and nonferrous production met., powder and advanced phys. met., atomic physics, physics of metals, electrodeposition of metals, and spectroscopy. President of M.S.C. Chapter A.S.M. Prefers Midwest, but not essential. Preference is production, quality control, etc. Available June 15.

Ralph Paul Lutz

Degree Expected: B. S. in Met. Eng.

School Address: 541 Pacific Ave., Lansing, Mich.
Home Address: Same

Age 21, single; draft status 1D. Reserve commission in R.O.T.C. Subjects include principles of metallurgy, Two terms of modern physics, one year of physical chemistry, courses in physical metallurgy of carbon and alloys steels and nonferrous metals and alloys. Prefers work in industrial plant or producing industry, preferably ferrous. Midwest (Michigan) preferred but not essential. Available June.

FOR FURTHER INFORMATION about these graduates
Write direct to student or to head of metallurgy department or placement bureau at the school. *See list on pages 19 and 20.*

University of Michigan

Ricardo Cortes
Degree Expected: B. S.
School Address: 116 North State St., Ann Arbor, Mich.
Home Address: Apartado aereo 382, Barranquilla, Colombia, S.A.

Age 23, married, no children, Citizen of Columbia. Courses include physical metallurgy, foundry, X-rays, advanced unit operations. Lab assistant in X-rays and research assistant in foundry. Capable of reading French in addition to fluently speaking English and Spanish. Desires position in steel industry. Available June.

Raymond Bradley Roof, Jr.
Degree Expected: M. S. in Met. Eng.
School Address: 1104 S. Forest, Ann Arbor, Mich.
Home Address: 149 College St., Battle Creek, Mich.

Age 22, married; draft status 2A(s). B.S. chem. eng. 1951; B.S. met. eng. 1951; both from University of Michigan. Graphite courses include X-ray analysis, corrosion and high-temperature met., pyrometry and furnace control, thermodynamics, explosives, electives of education. Distinguished Military Student, Regent's Alumni Scholarship 4 years; laboratory assistant in chemistry at Michigan 4 years. Experience includes physical science aide, ordnance, ballistics research; research assistant X-ray analysis on Navy project, University of Michigan. Desires teaching in U.S. Available September.

Stephen J. Stolton
Degrees Expected: B. S. in Chem. Eng.; B. S. in Met. Eng.
School Address: 1043 Baldwin, Ann Arbor, Mich.
Home Address: 4553 No. 27th St., Milwaukee, Wis.

Age 23, single. Army Ordnance ROTC. Attended Marquette University in Milwaukee. Courses taken include physical metallurgy, X-ray, metallurgical operations, process design. Technical electives include two nuclear engineering courses. Worked in engineering research on radiocatalysis and other projects. One year of civil engineering experience. Active member of student chapters of A.S.M., A.F.S., A.I.Ch.E. and A.O.A. Prefers development or production work. Midwest or Southwest preferred but not essential. Would accept foreign position. Available June 21.

George C. Towe
Degree Expected: Ph. D.
School Address: 411 West Davis St., Ann Arbor, Mich.
Home Address: Same

Age 30, married, one child; U.S.N.R. Thesis: Radioactive Tracer Studies by Autoradiography. Also experienced in X-ray analysis of high-temperature metal microphases. Essentially a chemist, but doctoral work is a metallurgical problem. Member Sigma Xi. Extensive public speaking courses. Three years at Naval Ordnance Laboratory as physicist; 3½ years in analytical laboratory (2 years head of lab) at Michigan Engineering Research Institute. Interested in physical chemistry as applied to metallurgy. Desires research or industrial. No geographic preference. Available 1952.

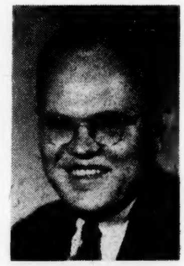
Missouri School of Mines and Metallurgy

Frank Murray Almeter
Degree Expected: B. S. in Met. Eng.
School Address: 1006 Rolla St., Rolla, Mo.
Home Address: Box 166, Mazeppa, Minn.

Age 22, single, draft status Is. Studies include physical metallurgy, production metallurgy, physical chemistry, engineering courses, modern physics, met. calculations, foundry engineering, and industrial organization and management. Member of A.S.M., A.I.M.E., and A.F.A. Summer experience in steel rolling mill. Interested in physical metallurgy with emphasis on heat treating, age hardening, and corrosion; second producing industry or sales.

John A. Bara, Jr.
Degree Expected: B. S. in Met. Eng.
School Address: 1210 Pine St., Rolla, Mo.
Home Address: 42 Raritan Ave., South River, N. J.

Age 24, single, veteran. Courses include physical metallurgy I, II, III; Fe, Cu, Pb and Zn process metallurgy; mineral dressing I and II, foundry, advanced calculus, theory of equations, differential equations, modern physics, nuclear physics, theory of X-rays, heat, kinetic theory of gases and thermodynamics. Tau Beta Pi; vice-chairman, M.S.M. Chapter A.S.M.; student assistant. Prefers research and development, or quality control. Any location. Available June 2.



Paul G. Barnard
Degree Expected: B. S. in Met. Eng.
School Address: 606 Walnut St., Rolla, Mo.
Home Address: 1470 North Edward St., Decatur, Ill.

Age 25, single; 2A draft status. Courses include principles of metallurgy, physical metallurgy, alloys and metallography, metallurgical calculations, materials testing, foundry engineering, production metallurgy (ferrous and nonferrous), special problems, refractories, high-temperature reactions, physical chemistry, heat, and personnel management. Desires industrial or production work on ferrous or nonferrous metals, but especially interested in production metallurgy. Any location. Available June 15.

Frederick Robert Bullivant
Degree Expected: B. S. in Met. Eng.
School Address: 104 East 10th St., Rolla, Mo.
Home Address: 72-10 34th Ave., Jackson Heights, N. Y.

Age 25, single; veteran, 2 years in U. S. Navy. Principal studies: Physical metallurgy, mineral dressing, foundry, metallurgical calculations, ferrous and nonferrous process metallurgy, refractories, physical chemistry. Member of A.F.S. and Lambda Chi Alpha. Desires producing industry or sales; ferrous or nonferrous. Metropolitan New York area preferred but not essential. Available June 1.

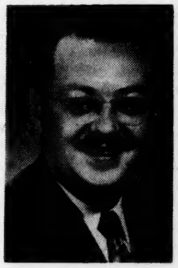
***FOR FURTHER INFORMATION* about these graduates**
Write direct to student or to head of metallurgy department or placement bureau at the school. *See list on pages 19 and 20.*

Missouri (Cont.)

Albin B. Charneski

Degree Expected: B. S. in Met. Eng.

School Address: 1005 Elm St., Rolla, Mo.
Home Address: 374 Menahan St., Brooklyn 37, N. Y.



Age 30, single; 1C status. Courses include physical metallurgy, process metallurgy, foundry, mineral dressing, metallurgical calculation and statistics, personnel management, refractories, high-temperature reactions, physical chemistry, welding. Foundry Educational Foundation Scholarship. Completed four-year apprenticeship as bench and floor molder in industrial and ornamental jobbing foundries. Summer work in automotive production foundry. Prefers production or quality control work. Any location. Available July 1.

Kenneth L. Cramer

Degree Expected: B. S. in Met. Eng.

School Address: 33 Green Acres, Rolla, Mo.
Home Address: 301 E. First St., Dixon, Ill.

Age 26, married, Navy veteran, 5A draft status, no reserve connections. Courses include physical metallurgy, both ferrous and nonferrous process metallurgy, foundry engineering, nondestructive testing, physical chemistry, and personnel management. Interested in ferrous production work. Midwest preferred, but not essential. Available early June.

Gedale D. Davis

Degree Expected: B. S. in Met. Eng.

School Address: M.S.M. Dormitory #318, Rolla, Mo.
Home Address: 3285 Gustine, St. Louis, Mo.

Age 22, single; draft status 2A. Courses include physical metallurgy, ferrous and nonferrous process metallurgy, metallurgical calculations, principles of foundry, industrial safety, refractories. Student member A.I.M.E., A.S.M., A.F.S. Worked one summer in lead smelter. Prefers nonferrous process industry. Midwest or West location. Available immediately.

Michael DeLucca, Jr.

Degree Expected: B. S. in Met. Eng.

School Address: 1107 State St., Rolla, Mo.
Home Address: 216 Netherwood Ave., Plainfield, N. J.

Age 24, single; veteran, inactive reserve. Courses include ferrous and nonferrous metallurgy, physical metallurgy, foundry, mineral dressing, refractories, radiography, industrial and personnel management, statistical analysis and quality control. Summer work in Al die-casting plant as X-ray, metallographic and control lab. assistant; also assisted quality control engineer in various problems. Prefers industrial work or producing industry. Eastern preference but not essential. Available June.

Donald E. Drewel

Degree Expected: B. S. in Met. Eng.

School Address: Pine and Highway 66, Rolla, Mo.
Home Address: Rural Route 1, Cuba, Mo.

Age 23, single; veteran not in reserves, 4A draft status. Courses include physical and process metallurgy, mineral dressing, metallurgical calculations, physical chemistry, and radiography. Desires industrial work in ferrous or light alloys. Midwest preferred. Available June 1.

Paul H. Hausner

Degree Expected: B. S. in Met. Eng.

School Address: 1109 Pine St., Rolla, Mo.
Home Address: 1311 E. 28th St., Kansas City 3, Mo.

Age 21, single; 2A draft status. Courses include physical chemistry, ferrous and nonferrous metallurgy, foundry engineering, three semesters and special problems in physical metallurgy, metallurgical calculations and materials testing. Summer work with steel mill, material testing, recording and charting of openhearth data. Summer with US Corps of Engineers, inspection of materials. Desires work in producing or industrial, ferrous metals, prime interest physical metallurgy. Any location. Available June.

Eugene Theodore Vanderheyden

Degree Expected: B. S. in Met. Eng.

School Address: 1203 State, Rolla, Mo.
Home Address: 4142 DeTonty, St. Louis 10, Mo.

Age 24, married; 4A draft status. Courses include nonferrous extractive metallurgy, electrometallurgy, thermodynamics of process metallurgy, and mineral beneficiation. Desires production engineering. Prefers midwest United States. Available February.

Roger E. Wakefield

Degree Expected: B. S. in Met. Eng.

School Address: 509 W. 11th St., Rolla, Mo.
Home Address: 7415 Nottingham Ave., Webster Groves 19, Mo.

Age 21, single; draft status 2A(S). Courses include ore dressing, ferrous and nonferrous process metallurgy, physical metallurgy, foundry metallurgy, metallurgical radiography, physical chemistry, refractories. Member A.F.S. and A.S.M. Summer work at American Brake Shoe, National Bearings Div. with centrifugal castings. Prefers nonferrous production metallurgy, beneficiation of nonferrous ores, or research work. Western location preferred, but not essential. Available June 2.

University of Minnesota

William O. Harms
Degree Expected: Ph. D.

School Address: 527 University Village, Como & 29th Ave. SE., Minneapolis 14, Minn.
Home Address: Same

Age 28, married, two children. Draft status V-A. Holds M.S. (phys. met.) U. of Minn., B.S. (met. eng.) Wayne Univ. Minor, physical chemistry; graduate courses include advanced mathematics, thermodynamics, modern physics, X-ray analysis, kinetics. Holder of AEC Predoctoral Fellowship. Member Tau Beta Pi, Gamma Alpha. Thesis: Thermodynamic Properties of Liquid Metals. Experience—2½ years in methods department, nonferrous industry. Desires research or teaching. Any location. Available summer, 1952.

University of Notre Dame

T. S. Liu
Degree Expected: Ph. D.

School Address: P.O. Box 145, Department of Metallurgy, University of Notre Dame, Notre Dame, Ind.
Home Address: Same

Age 26, single; B. S. in met. eng., National Chiao-Tung Univ., China, 1946; M. S. in met. eng., Mo. School of Mines, 1949. Master's thesis: Vacuum Metallurgy of Zinc; Doctoral thesis: Indium-Antimony and Indium-Arsenic Systems. Worked for two years as junior foundry metallurgist; two summers on Air Force titanium project. Desires producing industry or research. No geographical preference. Doctorate expected June, but available full time spring 1952.

Gene R. Pendl
Degree Expected: B. S. in Met.

School Address: R.R. 4, Box 262, South Bend, Ind.
Home Address: Same

Age 21, single; Army Organized Reserves. Courses include physical metallurgy, extractive metallurgy, phase diagrams, mineral dressing, seminar in metallurgy, differential equations, physics of metals, and physical chemistry. Industrial experience: Foundry cast iron analysis, auto factory punch-press operator and assembly-line, part-time laboratory assistant in school metallurgical laboratory. Desires producing industry or research, either ferrous metals or aluminum. Midwest preferred but not essential. Available June 16.

Ohio State University

John D. Altstetter
Degree Expected: B. S. in Met. Eng.

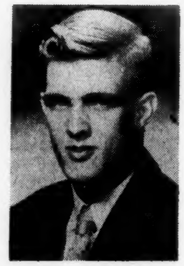
School Address: 2299 Neil Ave., Columbus 1, Ohio
Home Address: 1466 West Market St., Lima, Ohio

Age 27, married, veteran. Courses include metallography, physical metallurgy, X-rays, cast metals, foundry technology, molding methods, casting methods, thermochemical mineralogy, corrosion, steelmaking. Foundry Educational Foundation Scholarship. Two years jobbing steel foundry, one summer automotive gray iron foundry, one summer foundry research, nine months part-time corrosion research. Production, control or research, ferrous alloy foundry. Midwest preferred. Available July 1.

Pennsylvania State College

Kenneth Eugene Bouldin
Degree Expected: B. S. in Met.

School Address: 123 W. Nittany Ave., State College, Pa.
Home Address: R.D. 1, Box 194, Irwin, Pa.



Age 21, single. Classified 2A-S, a deferment to finish school. Courses include metallography, general, physical, ferrous and nonferrous metallurgy, fire assaying, mineral dressing, metallurgical investigations, electrical engineering, metallurgical calculations. Member of A.F.S. and played varsity basketball for two years. Prefers producing industry or consuming industry. Worked on labor gang in steel mill for one summer. East or Midwest preference. Available June 16.

Elton R. Foor, Jr.
Degree Expected: B. S.

School Address: 217½ South Atherton St., State College, Pa.
Home Address: 1411 Eighteenth Ave., Altoona, Pa.

Age 24, married; 4A draft status. Veteran. Graduated Navy Class A, Aviation Electronics Maintenance. Courses include chemical, physical, ferrous and nonferrous metallurgy, ferrous and nonferrous metallography, metallurgical engineering and investigations, physical chemistry, mechanical testing of materials, mechanics, electrical engineering, and industrial organization and administration. Worked six months as student technical laborer. Prefers work in the consuming or producing industry, either ferrous or nonferrous. Eastern location preferred but not essential. Available June 15.

Leonard Morris Hampson
Degree Expected: B. S. in Met.

School Address: Box 207 Hamilton Hall, State College, Pa.
Home Address: Box 3, Rogers, Ohio

Age 22, single, draft status 2A(s). Study includes ferrous, nonferrous, physical, and chemical metallurgy, a four-course series pertaining to economics, commerce, and industrial organization. Experience as laborer in metal fabricating plants, one year work on project at school. Prefers production or fabricating metallurgy, sales. Any location. Available June.

Michael Husack
Degree Expected: B. S. in Met.

School Address: 300 South Atherton St., State College, Pa.
Home Address: 252 Delaware Ave., Palmerton, Pa.

Age 23, married; draft status 3A. Courses include metallography, ferrous and nonferrous metallurgy, physical and chemical metallurgy, physical chemistry, personnel administration, and industrial organization. Two years experience in ferrous industry (rolling mill operations) and 1½ years in zinc industry. Desires producing industry or industrial plant, preferably ferrous. East preferred but not essential. Available July.

Penn State (Cont.)

Donald J. Kump
Degree Expected: B. S. in Met.
School Address: Phi Sigma Kappa, 501 South Allen St. State College, Pa.
Home Address: 129 East Fifth St., Berwick, Pa.

Age 23, single; 2A-S draft status. Courses include physical metallurgy, process metallurgy, ferrous metallurgy, metallography, structure and properties of alloys, physical chemistry, electrical engineering. Experienced draftsman. Interested in titanium research and development or ferrous production metallurgy. Great Lakes region and eastern states preferred but not essential. Available June 15.

Carl C. Popadick
Degree Expected: B. S. in Met.
School Address: Box 399, Hamilton Hall, State College, Pa.
Home Address: 44 Conyngham St., Ashley, Pa.

Age 25, single, veteran. Attended Wilkes College. Courses include chemical, physical, ferrous and nonferrous metallurgy, ferrous and nonferrous metallography, metallurgical investigations and engineering, survey of ceramic technology, electrical engineering. Producing industry or industrial work preferred. East or Midwest location preferred but not essential. Available August 15.

Louis Zakraysek, Jr.
Degree Expected: B. S. in Met.
School Address: 301 S. Allen St., State College, Pa.
Home Address: 638 Main St., Vintondale, Pa.

Age 23, single, veteran. Attended Gannon College. Courses include mineral preparation, geology, chemical, physical, ferrous, and nonferrous metallurgy, metallurgical investigations, ferrous and nonferrous metallography. Summer experience on electric furnace and in pouring pit, ferrous metals. Prefers production industry or plant laboratory. Eastern territory preferred. Available June 16.

University of Pennsylvania

Benjamin C. Allen
Degree Expected: B. S. in Met. Eng.
School Address: 3337 Walnut St., Philadelphia, Pa.
Home Address: 520 Panmure Rd., Haverford, Pa.

Age 21, single; draft status 2A. Courses include ferrous and nonferrous chemical and physical metallurgy, mechanical metallurgy. Tau Beta Pi and Sigma Tau honor societies. Worked summers in cast iron foundry lab. Plans to go to MIT graduate school in met. Prefers teaching or research work. Any location. Available after graduate school.

Greg J. McLean
Degree Expected: B. S. in Met. Eng.
School Address: 1511 S. 28th St., Philadelphia 46, Pa.
Home Address: Same

Age 21, single; draft status 2A. Courses include chemical, mechanical, and physical metallurgy, physical chemistry, 6 sc. thermodynamics, turbine design, internal combustion engines, economics and business law. Summer experience as third helper in an openhearth shop and as lab assistant in a steel casting plant. Prefers production or development. No geographic preference. Available June.

University of Pittsburgh

Anthony DelGrosso
Degree Expected: B. S. in Met. Eng.
School Address: 168 Short St., New Kensington, Pa.
Home Address: Same

Age 25, single. World War II veteran, 4A status. Courses include electrometallurgy, physical metallurgy, iron and steel, metallography, X-rays. Summer experience two years in manufacturing plants. Over 6 months experience as junior metallurgist with Rockwell Manufacturing Co. Desires work in production or engineering sales. Available immediately.

Theodore Joseph Kisiel
Degree Expected: B. S. in Met. Eng.
School Address: 1101 Roup Ave., Brackenridge, Pa.
Home Address: Same

Age 21, single; 2A(s) draft status. Courses include physical, ferrous, and nonferrous metallurgy, metallography, and electrometallurgy. State senatorial scholarship for four years. Dean's list. Two years experience in sheet finishing operations of steel mill. Desires ferrous production or research work. Northeastern U. S., preferred but not essential. Available June.

James S. Trees
Degree Expected: B. S. in Met. Eng.
School Address: 219 Lock St., Tarentum, Pa.
Home Address: Same

Age 25, married, two children; veteran. Courses include four semesters of physical metallurgy and two semesters of metallurgical thermodynamics plus prescribed courses. Three years experience as lab. assistant at Aluminum Research Laboratory of Aluminum Co. of America. Prefers refining and fabrication of metals. Any location. Available June 16.

FOR FURTHER INFORMATION about these graduates
Write direct to student or to head of metallurgy department or placement bureau at the school. *See list on pages 19 and 20.*

Queen's University

Stanley T. Wlodek
Degree Expected: B. S. in Met. Eng.
School Address: 36 Aberdeen St., Kingston, Ont., Canada
Home Address: 269 McLeod St., Ottawa 4, Ont., Canada

Age 21, single. Courses include chemical, ferrous and nonferrous metallurgy, ore dressing, geology, mineralogy, physical chemistry, electrochemistry, thermodynamics, electrical engineering, hydraulics, and machine design. Fourteen months summer experience as assistant in various research projects dealing with problems in nonferrous physical metallurgy and ore dressing. Some supervisory experience. Desires research or producing industry, ferrous or nonferrous. No territorial preference. Available May 1; may wish to continue studies in September.

Rensselaer Polytechnic Institute

Robert J. Allio
Degree Expected: B. Met. Eng.
School Address: 2 Eaton Road, Troy, N. Y.
Home Address: High St., Livingston Manor, N. Y.

Age 20, single; draft status, 2A. Courses include principles of metallurgy, metal casting and processing, welding, physical chemistry, physical metallurgy, metallography, production metallurgy, thermodynamics, electrometallurgy, nonferrous alloys. Publications, honor societies. Two summers work as civil engineer, one summer as research metallurgist. Prefers production or sales. Any location. Available June.

Harry D. Ambs, Jr.
Degree Expected: B. Met. Eng.
School Address: Sigma Alpha Epsilon, Hawthorne Ave., Troy, N. Y.
Home Address: 16407 Grand Central Parkway, Jamaica 2, N. Y.

Age 22, single, draft status 2AS. Courses include metallurgical thermodynamics, physical metallurgy, electrometallurgy, metallography, welding engineering, production metallurgy, plus courses in ferrous and nonferrous metals. Electives in electrical engineering, chemical engineering, physical chemistry and inspection of metals. Active in fraternity work as treasurer. Prefers industrial or development work. Any location. Available June 10.

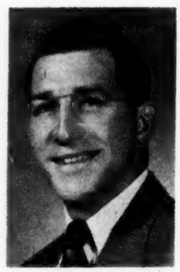
John J. Chisholm
Degree Expected: B. Met. Eng.
School Address: 186 Eighth St., Troy, N. Y.
Home Address: 172-06 Crocheron Ave., Flushing, N. Y.

Age 22, single; Lt., U.S.A.R., Courses include principles of metallurgy (two courses), metallurgical thermodynamics, nonferrous alloys, metallography, electrometallurgy, ferrous alloys, production work in either nonferrous or ferrous field. Second choice sales. Preferably northeastern U. S. Available June.

Herbert S. Burkin
Degree Expected: B. Met. Eng.
School Address: 12-2 Edgehill Terrace, Troy, N. Y.
Home Address: 2847 Derbyshire Rd., Cleveland Heights, Ohio

Age 24, married; draft status 4F. Courses include physical metallurgy, metallography, welding processes and applications, welding engineering, machine design, structural design and analysis. Worked as metallurgical lab assistant, U. S. Arsenal in Watervliet; physics lab assistant; machine operator part-time. Prefers welding research or development work in production, but will accept metallurgical research or development work. Will accept employment only in the southwestern section of the U. S. because of health. Available July.

John L. Clark
Degree Expected: B. Met. Eng.
School Address: 37 Longview Ave., West Sand Lake, N. Y.
Home Address: Same



Age 20, single; 2A draft status. Main courses include alloy steels, metal casting, forming; principles of metallurgy, metallography, ferrous, production, and physical metallurgy, physical chemistry, thermodynamics, electrometallurgy, shop processes, economics, physics, geology, heat engines, electrical engineering, drawing. Track, baseball, clubs. Works published include "Look for Improved Methods for Tin Plate". Research experience in magnesium alloys; other experience in production of electrical insulation board, carpenter, mason, plumber. Desire production. No geographical preference. Available June.

Howard Cuvin
Degree Expected: B. Met. Eng.
School Address: 6-4 Blatchford Dr., Troy, N. Y.
Home Address: c/o Anne Berger, 657 St. Marks Ave., Brooklyn, N. Y.

Age 27, married; draft exempt. Holds B. S. in chemistry. Courses include metallurgical engineering, physical metallurgy, chemical and metallurgical thermodynamics, electrometallurgy. metallography, and physical, organic and analytical chemistry. Desirous of position where both chemistry and metallurgy are required. Worked in scrap metal industry. Geographically flexible although East Coast preferred. Available immediately.

Marvin B. Happ
Degree Expected: B. Met. Eng.
School Address: 342 Washington Ave., Albany 3, N. Y.
Home Address: Same

Age 21, single. Reserve commission upon graduation. Studies include physical metallurgy, nonferrous alloys, metallurgical thermodynamics, electrometallurgy, physical chemistry, chemical engineering theory. Member Tau Beta Pi. Desires plant work in ferrous or copper industry. Northeastern U. S. preferred, but not essential. Available June.

FOR FURTHER INFORMATION about these graduates
Write direct to student or to head of metallurgy department or placement bureau at the school. *See list on pages 19 and 20.*

Rensselaer (Cont.)

James G. Darrah

Degree Expected: B. Met. Eng.

School Address: 130 6th Ave., Troy, N. Y.
Home Address: Telegraph Road, Middleport, N. Y.

Age 23, single, veteran. Courses include physical metallurgy, metallurgical thermodynamics, engineering metallurgy, production metallurgy, metallography, electrometallography, alloy steels, ferrous metallurgy, welding engineering, electrical engineering, physical chemistry, analytical chemistry. Extracurricular activities include basketball, softball, newspaper, rifle and pistol club and campus chest. Three years in radiator company inspection department and two summers with a food machinery company in the machine shop and stockroom. Prefers work in engineering development. No territorial preference. Available July 1.

Michael Kulakofsky

Degree Expected: B. Met. Eng.

School Address: 1661 Tibbits Ave., Troy, N. Y.
Home Address: Blackstone Hotel, Omaha, Neb.

Age 21, single; 1A draft status. Courses include electrometallurgy, alloy steel, nonferrous alloys, and flow and fracture of solids. College activities include editor-in-chief of yearbook, house manager of social fraternity, and executive committee of dramatic society. Work experience includes four summers as summer camp counselor and trip leader, and part-time work as butcher and beef boner. Desires employment as sales engineer. Midwest preferred, but not necessary. Available end of June.

Jay L. Reiss

Degree Expected: B. S. in Met. Eng.

School Address: 42 South Lake Ave., Troy, N. Y.
Home Address: 136-32 71 Road, Flushing, N. Y.

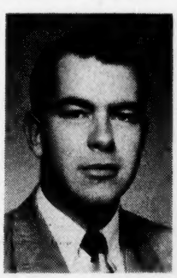
Age 21, single; 2A-S draft status. Courses include physical metallurgy nonferrous alloys, electrometallurgy, alloy steels, metallurgical thermodynamics, metallography, and welding processes and applications. Member of Tau Beta Pi and Phi Lambda Upsilon. President and treasurer of social fraternity. Industrial experience in smelter and refinery control laboratory, and metal chasing. Desires position in operations and control in producing industry. Available June.

Charles H. Stattel

Degree Expected: B. S. in Met. Eng.

School Address: 451 Broadway, Troy, N. Y.
Home Address: 15 Park Dr., Kings Park, L. I., N. Y.

Age 21, single; draft status 2S. Subjects of major study: Physical metallurgy, welding processes and applications, welding engineering, inspection of metals, metallurgical thermodynamics, physical chemistry, ferrous metallurgy. Upper half of class, charter member of Kappa Tau fraternity. Summer experience in spot welding of aluminum alloys for aircraft. Interested in welding and production. Northeastern region preferred. Available June.



Harold D. Swarr

Degree Expected: B. Met. Eng.

School Address: 31 Belle Ave., Troy, N. Y.
Home Address: P. O. Box 235, Christiana, Pa.

Age 21, single; draft status 2S. Courses include production metallurgy, metallography, physical metallurgy, metallurgical thermodynamics, electrometallurgy, nonferrous alloys, alloy steels, and ferrous metallurgy. Member of a social fraternity. Interested in production and sales in steel industry. Anywhere in U. S. Available July 1.

Richard Lawrence Werner

Degree Expected: B. of Mech. Eng.

School Address: 266 8th St., Troy, N. Y.
Home Address: 143-26 232 St., Rosedale 10, N. Y.

Age 21, single; 2A-s draft status. Courses included thermodynamics, heat transfer, hydraulics, machine design, machine dynamics, physical metallurgy, nonferrous alloys, light alloys, inspection of metals, physics and chemistry. Honor fraternities. Cheerleader, theatre group, technical magazine. Secretary of social fraternity. Two summers experience as maintenance-helper in plastics plant. Two summers experience as junior engineer and draftsman in aluminum plant. Prefers production engineering in light metals industry. Anywhere in U. S. Available July 1.

Robert Irwin Werner

Degree Expected: B. Met. Eng.

School Address: 266 8th St., Troy, N. Y.
Home Address: 143-26 232 St., Rosedale 10, N. Y.

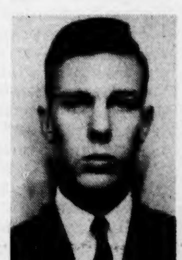
Age 21, single; 2A-s draft status. Courses include principles of metallurgy, production metallurgy, physical metallurgy, metallography, thermodynamics, alloy steels, inspection of metals, electrometallurgy, machine design, welding, personnel management, light alloys. Honorary fraternities. Cheerleader, fraternity vice-president, technical magazine staff editor. Worked two summers as maintenance helper, two summers as junior engineer in an aluminum plant, one year on a magnesium research project. Prefers production work in light metals industry. No geographical preference. Available July 1.

Ryerson Institute of Technology

James Wells McDonald

School Address: 50 Gould St., Toronto Ont., Can.
Home Address: 102 Deloraine Ave., Toronto 12, Ont., Can.

Age 22, single, Canadian. Courses include physical metallurgy of iron and steel and nonferrous alloys, metallography, heat treating, welding, general engineering. Thesis: "Industrial Heat Treating Furnaces and Fuels". Undergraduate, eligible for P.Eng. after four years' experience. Three months' experience in foundry laboratory and foundry at E. Long, Limited. Production metallurgy desired in steel mill, preferably in Southern Ontario. Available June 1st.



Stanford University

Laurence E. Poteat

Degree Expected: M. S. in Met. Eng.

School Address: Mining nad Metallurgy Bldg., Stanford, Calif.

Home Address: Box 206, Bakersville, N. C.

Age 25, single, veteran. B. mech. eng. at N. C. State College. Courses at Stanford include ferrous and nonferrous, process and physical metallurgy. Honorary fraternities—Tau Beta Pi, and Pi Tau Sigma. Other fraternities—Theta Tau and Pi Kappa Phi. Summer experience in openhearth. One year as high school instructor. Laboratory assistantship and A.E.C. metallurgical project research at Stanford. Prefers physical metallurgy in consuming industry. No territory preference. Available March or June.

Richard D. Seibel

Degree Expected: B. S. in Met.

School Address: 308 Village, Stanford, Calif.

Home Address: 388 West Main St., American Fork, Utah

Age 21, single; 1A draft status. Courses include physical metallurgy and chemistry, electrometallurgy, corrosion theory, foundry practice, spectrography, process metallurgy, mineral dressing, welding, advanced strength of materials, metallography and heat treatment. Worked two summers in steel plant in process control and sampling. Prefers research producing or consuming industry. West preferred but not essential. Available June 16.

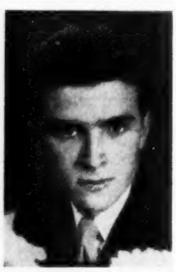
University of Toronto

David Robinson Burne

Degree Expected: B. A. Sc.

School Address: 15 Kings Garden Rd., Toronto 18, Ont.

Home Address: Same



Age 21, single. Courses include physical metallurgy, metallurgical theory, thermodynamics, refractories, extractive metallurgy, problems. Thesis subject: "The Effect of Small Quantities of Tin and Lead on the Cold Rolling Properties of Silver." Summer work in Canadian nickel mine and smelter, and aluminum fabrication plant as press operator and inspection work. Prefers sales and service or producing industry. Any location. Available May 1.

Edward C. Garrow

Degree Expected: B. A. Sc. in Met. Eng.

School Address: 5 Madison Ave., Toronto, Ont.

Home Address: 67 Humber Trail, Toronto, Ont.

Age 34, single; veteran (Canadian Forces). Subjects include physical metallurgy, principles of extractive metallurgy, ferrous and nonferrous production metallurgy, metallurgical theory and problems, ore dressing, and various courses in chemistry, electricity, mechanics, mathematics, etc. Honors obtained in third year. Summer work in aluminum industry, nickel smelting, laboratory work, surveying, mining. Interested in either production or development work in any metallurgical industry. Any location. Available about May 15.

Kewal L. Karna

Degree Expected: M. A. Sc.

School Address: 143 Spadina Rd., Toronto, Ont.

Home Address: Same

Age 30, single. Holds B.S. degree in metallurgy (Benares University). Courses include extractive and physical metallurgy, mechanical testing, thermodynamics, alloy steels, heat-treatment, assaying, fuels. Thesis: Intercrystalline Slip in Metals. Experience as a metallurgist on testing, development, research and lab. Trouble shooting assignments with government of India (one year), the Tata Iron and Steel Industry (four years) and the Algoma Steel Corp., Canada (one year). Development work in alloy steels and nodular cast iron. Desires producing industry or development work. Any part of Canada. Available May 15.

Edward R. Landry

Degree Exepcted: B. A. Sc.

School Address: Dept. of Metallurgical Engineering, University of Toronto

Home Address: 35 Bedford Park Ave., Toronto, Ont.

Age 21, single. Thesis: X-Ray Diffraction Investigation of Alpha Brass. Studies include general engineering subjects, physical metallurgy, extractive metallurgy (ferrous and nonferrous), ore dressing, fire assaying, refractories, physical chemistry, electrochemistry, and thermodynamics. First class honors second and third year. Class rep. third year. Member Mining and Metallurgy Club. Experience as lab. technician in copper and brass industry. Sales or production work preferred. Eastern Canada or Northeastern U. S. Available May.

Robert S. Lehto

Degree Expected: B. A. Sc. in Met. Eng.

School Address: 101 Lawton Blvd., Toronto 12, Ont.

Home Address: Same

Age 21, single. Courses in extractive and physical metallurgy, including laboratory courses in physical testing, X-ray examination of metals and microphotography. Assaying, ore dressing and extractive metallurgy laboratory work. **Thesis: Vacuum Distillation Rates of Metals.** Three years summer experience with copper and nickel concentrating, smelting and refining in Northern Ontario. Production work along smelting and refining lines on base metals desired. In good health and would travel anywhere. Available mid-June.

Walter Alan Smith

Expected Degree: B. A. Sc.

School Address: 15 Athlone Dr., Toronto 18, Ont.

Home Address: Same

Age 28, married, two children; veteran, six years in Canadian Army. Courses include ferrous and nonferrous production metallurgy, thermodynamics, physical metallurgy, also nontechnical subjects such as philosophy of science, political and engineering economics, plant management, etc. Thesis: Nitrogen and Chlorine Degassing of Molten Aluminum Alloys. Experience in technical development for large aluminum foundry; public works inspector two years municipal engineering department. Desires industrial work in nonferrous producing industry Available April 30.

Syracuse University

Warren Irving Pollock
Degree Expected: B. S. in Chem.

School Address: 143 Redfield Pl., Syracuse 10, N. Y.
Home Address: 7 Trenaman St., Rochester 21, N. Y.

Age 21, single; draft status 2A-S. Original research on the iron-tungsten-carbon phase diagram with emphasis on the complex carbides and diffusion studies. Courses in metallography, physical metallurgy, X-ray methods, X-ray crystallography, materials of engineering, qualitative and quantitative analysis, physical chemistry, phase diagrams, advanced general physics, and treatment of experimental data. Member of Alpha Chi Sigma. Chairman student affiliation of American Chemical Society. Prefers research. Will locate anywhere. Available June 15.

Virginia Polytechnic Institute

John Edward Andrews
Degree Expected: B. S. in Met. Eng.

School Address: Box 2533, Va. Tech Station, Blacksburg, Va.
Home Address: 191 Piedmont Ave., Colonial Heights, Va.

Age 21, single; draft status 2S. Courses include physical chemistry, physical metallurgy, metallurgical calculations, ferrous metallurgy, nonferrous metallurgy, metallography. Vice-president of local chapter of A.S.M. and secretary-treasurer of fraternity. Summer work as student metallurgist at Naval Ordnance Lab. Desires work in production. East preferred but not essential. Available June 15.

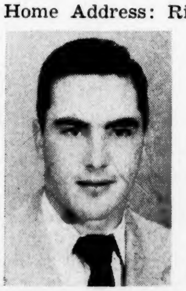
Thomas B. McCaleb
Degree Expected: B. S.

School Address: Box 4317, Virginia Tech Station, Blacksburg, Va.
Home Address: Route 1, Front Royal, Va.

Age 21, single; draft status 1D, reserves. Courses in physical metallurgy, ferrous and nonferrous metallurgy, metallography, furnace design, refractories, fire assaying, foundry and welding methods, metallurgical calculations, physical chemistry, qualitative and quantitative analysis. Member Pi Delta Epsilon (honorary journalism fraternity), vice-president of social club. Prefers research or development work. Any location. Available June 18.

Troy N. Washburn
Degree Expected: B. S.

School Address: Box 6196, Va. Tech Station, Blacksburg, Va.
Home Address: Ridgeway, Va.



Age 21, single; 1D draft status (R.O.T.C.). Courses include physical, ferrous, nonferrous, and general metallurgy, calculations, metallography, fire assaying, corrosion of metals, furnace design. Member of Cotillion Club, Arnold Air Society, Scabbard and Blade. Prefers production or development work. East preferred but not essential. Available July 1.

University of Utah

Edward Goss, Jr.
Degree Expected: B. S. in Met. Eng.

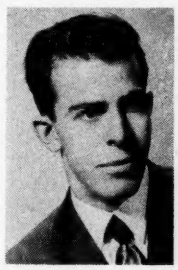
School Address: 546 East 5th South, Salt Lake City, Utah
Home Address: Same

Age 30, married, one child; veteran, status 4A. Attended Newark College of Engineering and University of Utah. Majored in physical metallurgy. Thesis: Thermo Batteries. Four years practical machine shop experience, and one year training for electronic technician in U.S. Navy. Worked last summer as observer in rolling mill. Desires work in ferrous or nonferrous producing industry. Rocky Mountain area preferable but not essential. Available June 12.

University of Washington

Gareth L. Bibbins
Degree Expected: M. S. in Met. Eng.

School Address: 8216 30th Ave., N. E., Seattle 5, Wash.
Home Address: Same



Age 28, married; V-A draft status. Courses include physical metallurgy, powder metallurgy, theory of alloys, alloy steels, X-ray radiography, diffraction. Master's thesis: Effect of Ultrasonics in Nitriding Steel. Engineering magazine staff, writer. Openhearth observer and chemist, 19 months. Foreman in state and federal service 14 months in research and production. Desires opportunity for progressive experience. Particularly interested in high-temperature alloy development and production (fusion or powder metallurgy). Available anywhere July 1.

Margaret Marie Parent
Degree Expected: B. S. in Met. Eng.

School Address: 2010 10th North, Seattle 2, Wash.
Hom Address: Rt. 7, Box 246, Tacoma, Wash.

Age 21, single; inactive reserve. Courses include physical metallurgy, metallography, ferrous and nonferrous metallurgy, physical and analytical chemistry, calculations, mineral dressing, mineralogy, fire assaying, mining methods, fuels technology, prescribed engineering courses. Undergraduate thesis: Metallurgical Analysis of Some Western Archeological Copper. Assoc. editor engineering magazine, secretary-treasurer of the Mines Society, vice-president of social sorority, member of Engineering Students Council. Prefers research or industrial. Any location. Available June.

Joseph E. Tauscher
Degree Expected: B. S. in Met. Eng.

School Address: 4387 Union Bay Lane, Seattle 5, Wash.
Home Address: 305 Pine St., Elma, Wash.

Age 27, married, 3 children; draft status 5A. Courses include ferrous and nonferrous physical metallurgy, mineral dressing and extractive metallurgy, inspection of metals, alloy steels, metallography, foundry practice, nonferrous metallurgy, light metals and alloys, physical chemistry, powder metallurgy. Rated commercial pilot, wide experience in use of logging equipment; six months experience in installation, maintenance and repair of metallurgical laboratory equipment. Prefers research or producing industry in West Coast area or midwest. Available August.

Washington (Cont.)

Stanley Jan Golka

Degree Expected: B. S. in Met. Eng.

School Address: 3408 Dungeness Place, Seattle 5, Wash.
Home Address: 9032 Burke Ave., Seattle 3, Wash.

Age 33, married, one child. Courses include physical, ferrous, nonferrous metallurgy, calculation, metallography, fire assaying, corrosion. Two years in Mining Academy, Krakow, Poland before World War II. Practice in industrial plants at Krakow, Bremen, Bochum (smelting processes and nail factory) during the war. Pacific Coast preference. Available December 1952.

University of Wisconsin

Richard John Aylward

Degree Expected: B. S. in Met. Eng.

School Address: 202 Chamberlin, Kronshage Unit, Madison 6, Wis.
Home Address: 402 Ninth St., Neenah, Wis.

Age 22, single; draft status 2S. Courses include foundry, physical metallurgy, metallography, heat treatment, metallurgical calculations, ferrous and nonferrous production metallurgy. Summer industrial experience in most departments of a production foundry. Desires production work in ferrous metals. Midwest preferred but not essential. Available June.

Morris C. Fraser

Degree Expected: B. S. in Met. Eng.

School Address: 214 Swenson, University Mens' Dorms, Madison 6, Wis.
Home Address: East Troy, Wis.

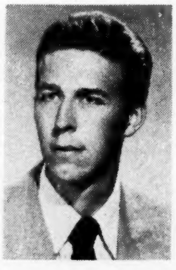
Age 25, single, draft status 4A. Subjects include physical metallurgy, heat treatment of iron and steel, metallography, metallurgy of iron and steel, metallurgy of nonferrous metals, metallurgical calculations, metallurgical processes, introduction to X-ray studies, physical chemistry. Prefers research development. Any location. Available June.

Robert Jack Christ

Degree Expected: B. S. in Met. Eng.

School Address: 222 No. Brooks St., Madison, Wis.
Home Address: 4044 No. 39 St., Milwaukee, Wis.

Age 23, married, one child. Special elective studies, in addition to basic metallurgical engineering requirements, include advanced foundry control and research, personnel management, studies of human relations in industry, welding and machine tooling. Foundry Education Foundation Scholarship. Member A.F.S. and A.I.M.E. Assistant to the instructor of basic foundry operations laboratory at U. of W. Industrial experience includes foundry training program and casting cleaning operations. Desires foundry research or metallurgical control work. No regional preference. Available in June.



Henry M. Shillinglaw

Degree Expected: B. S. in Met. Eng.

School Address: 202 North Fourth, Madison 4, Wis.
Home Address: Same

Age 22, single; draft status 1A. Courses include assaying, metallography, foundry metallurgy, physical metallurgy, physical chemistry, hydrometallurgy, extractive metallurgy, mineral dressing, metallurgical calculations, industrial alloys, alloy structures, X-ray, welding, industrial management, accounting, electrical machinery, and human relations. Secretary and publicity chairman, student A.I.M.E. chapter. Summer work as smelterman in copper smelter. Desires work in producing industry or industrial plant with ferrous metals or A1. Any location. Available July 1.

David L. Wheeler

Degree Expected: B. S. in Met. Eng.

School Address: 1917 Vilas Ave., Madison 5, Wis.
Home Address: 7720 Rogers Ave., Wauwatosa 13, Wis.

Age 27, single; draft status 5A; 10% disability rating. Courses include physical metallurgy, physical chemistry, ferrous and nonferrous metallurgy, foundry metallography, ore dressing, X-ray and spectroscopy, surface metallurgy, industrial alloys, heat treatment. In University Pistol Club. Worked in experimental and physical test labs and summers at material handling and foundry. Prefers research and development, ferrous or alloy. No territory preference. Available June 30.

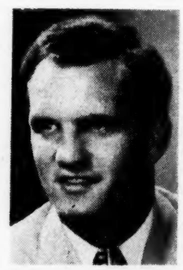
Youngstown College

Richard M. Hannis

Degree Expected: B. S. in Met. Eng.

School Address: 1726 E. Midlothian Blvd., Youngstown, O.
Home Address: Same

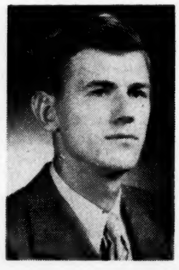
Age 22, single; draft status 2A-S. Thesis: "Study of the Causes of Blistering of Vitreous Enamel on Sheet Steel Products." Courses include general metallurgy, physical metallurgy, metallography, metallurgical analysis, iron and steel metallurgy, iron and steel foundry, nonferrous metallurgy. Experience at preparing metallic specimens for microstructure work. Desires work in ferrous producing industry or research. Northeast preferably Youngstown. Available June.



John Paul Kalla

Degree Expected: B. S. in Met.

School Address: 21 North Fruit St., Youngstown, Ohio
Home Address: Same



Age 26, single; veteran, draft status 5-A. Subjects include physical metallurgy, iron and steel metallurgy; metallography, metallurgical calculations, physical chemistry. Has done manual work in steel plant. Prefers work in producing industry or development. Midwest or East preferred. Available June 15.

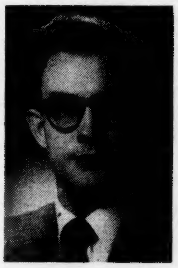
Youngstown (Cont.)

Edwin Rolland MacDougall

Degree Expected: B. Eng., Major in Met. Eng.

School Address: 410 Wick Ave., Youngstown 2, Ohio

Home Address: 63 South Main St., Youngstown 9, Ohio



Age 23, single; draft status 2S. Courses include physical metallurgy, metallurgical calculations, physical chemistry, strength of materials, metallography, and ferrous and nonferrous metallurgy. Chairman of ASM student chapter at college. Desires work with ferrous metals. Location unimportant. Available June 20.

James J. Stork

Degree Expected: B. Eng. in Met. Eng.

School Address: 656 Wick Ave., Youngstown, Ohio

Home Address: 811 Riverside Drive, Wellsville, Ohio

Age 30, married, two sons; inactive reserve. Courses include general metallurgy, iron and steel metallurgy, nonferrous metallurgy, metallography, physical chemistry, metallurgical calculations. Eight years industrial experience, including part-time work while in college, in ferrous industry. Prefers sales or production in ferrous industry. Any location. Available July 7.

Wayne University

Harvey Lewis Chesney

Degree Expected: B. S. in Met. Eng.

School Address: 12624 Santa Rosa Dr., Detroit 4, Mich.

Home Address: Same

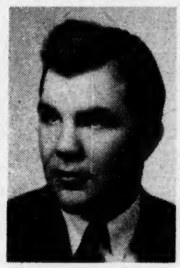
Age 21, single; draft status 2A-S. Electives include electrometallurgy, X-ray metallurgy, spectroscopy, seminar in metals—subject: Powder Metallurgy. Member and former secretary of Wayne University Metallurgical Society. One year as laboratory assistant in the metallurgy department; one year, part time, with a consulting metallurgist. Summer work in an auto factory and as an apprentice sheet metal worker. Desires research or industrial work. Midwest preferred but not essential. Available June.

Steven Sowa, Jr.

Degree Expected: B. S. in Met. Eng.

School Address: 17461 Allen Rd., Melvindale, Mich.

Home Address: Same



Age 23, single; 4F draft status. Courses include ferrous and nonferrous metallography and production metallurgy, thermodynamics, electrometallurgy, X-ray metallurgy, physical metallurgy, physical chemistry. Thesis subject: Heat Treatment of Alloy Cast Irons. Experience as lab. assistant. Vice-president of student metallurgical society. No preference as to type of work. Midwest preferred. Available June.

A Suggestion to Metals Review Readers:

The preceding 25 pages of this special issue of Metals Review carry the Junior Member Placement Service inaugurated a year ago. In these pages appear photographs and qualifications of nearly 200 graduating metallurgists who will be available to industry between now and next summer.

In these days of manpower shortages, you could do your company a big favor by passing this special issue on to the employment or personnel manager, with a note calling his attention to the explanatory introduction on page 19.

This list of available young engineers is issued as a service to the metals industry by the American Society for Metals—the engineering society of the Metals Industry.

THE EDITOR

A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received During the Past Month

Prepared in the Library of Battelle Memorial Institute, Columbus, Ohio
W. W. Howell, Technical Abstractor
Assisted by Janet Motyka, Maxine Runkle and Members of the Translation Group

A GENERAL METALLURGICAL

24-A. 1951 Vessel Shipments of L. S. Iron Ore Totaled 89,092,012. *Skillings Mining Review,* v. 40, Dec. 22, 1951, p. 1-2.
Includes graph indicating shipments from Lake Superior year by year since 1885. Table shows shipments from different upper-lake ports. (A4, Fe)

25-A. Management of Industrial Research. James C. Zeder. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 1-6.
Importance of research in industry today. Functions of a research director. (A9)

26-A. Problems of Dust Removal and of Ventilation in the Foundry Industry. (In French.) Wolf Mulharad. *Fonderie,* Nov. 1951, p. 2671-2684.
Nature of dusts, sources of emission of vapors and dusts, their neutralization, and types of dust removers now in use. (A7, E general)

27-A. World Supply of Non-Ferrous Metals. R. Lewis Stubbs. *Engineering,* v. 172, Nov. 30, 1951, p. 702-703; Dec. 7, 1951, p. 732-734.
Data on production and consumption of all the major nonferrous metals; namely, Cu, Zn, Sn, Al, Mg. Allowance is made for the role of scrap, the amount of which continues to rise in increasing proportion with the rise in the consumption of the virgin metal. Data are tabulated.
(A4, Cu, Zn, Sn, Al, Mg)

28-A. The Steel Supply Picture for 1952. R. F. Sentner. *Finish,* v. 9, Jan. 1952, p. 26, 83-84.
Briefly discussed. (A4, ST)

29-A. Technical Trends; Ingenuity Must Overcome Shortages in 1952. D. I. Brown. *Iron Age,* v. 169, Jan. 3, 1952, p. 253-259.
A summary covering a selected group of developments of 1951, in the metalworking industry. 27 ref. (A general)

30-A. Defense Controls Guide. *Iron Age,* v. 169, Jan. 3, 1952, p. 327-334.
Digests principal material control orders affecting the metalworking industry, lists CMP regulations and NPA forms, revised to Dec. 15, 1951. Also a list of controls officials with their room and telephone numbers. Four pages list principal metal products bought by the armed forces and locations of the buying offices. (A4)

31-A. *The Iron Age* 1952 Metal Industry Facts. *Iron Age,* v. 169, Jan. 3, 1952, p. 381-476.
Includes sections on: steel industry, nonferrous metals, raw materials, metal products, casting, forging, machinery, market data, labor and safety. Extensive tabular data. (A4)

32-A. National Trade Associations and Technical Societies. *Iron Age,* v. 169, Jan. 3, 1952, p. 478, 480, 482, 484-486, 488, 490.
A list of some 200 professional and technical societies and trade associations in metalworking and metal production. (A10)

33-A. Metalworking Meetings Scheduled for 1952. *Iron Age,* v. 169, Jan. 3, 1952, p. 512-514, 516.
Technical meetings, conventions and expositions on various phases of metalworking and metal production. (A10)

34-A. Secondary Heavy Metals. E. H. Jones. *Metal Industry,* v. 79, Nov. 30, 1951, p. 457-459.
Primary and secondary reserves of metals available for existing needs. Technical improvements in scrap recovery. (A8, B10)

35-A. Secondary Aluminum and Magnesium. W. C. Devereux. *Metal Industry,* v. 79, Dec. 7, 1951, p. 483-485.
Growth of the secondary Al industry from comparative obscurity to its present position. Developments now in use and those which appear to have a promising future. Difficulties as yet unsurmounted. (A8, Al, Mg)

36-A. Metallurgy at the Bureau of Standards in the Past 50 years. John G. Thompson. *Metal Progress,* v. 60, Dec. 1951, p. 51-57.
The original organization consisted of six divisions concerned with the establishment and maintenance of standards in the fields of electricity, weights and measures, heat and power, optics, chemistry and mechanics. Accomplishments in recent years. (A9)

37-A. Spectacular Growth In Magnesium Consumption; Pre-Korea Plans To Boost Output Accelerated. J. D. Hanawalt. *Metals,* v. 22, Dec. 1951, p. 9, 12, 18.
Economic status and present trends. (A4, Mg)

38-A. Increasing the Supply of Lead and Zinc. Otto Herres, II. *Mines Magazine,* v. 91, Dec. 1951, p. 31-32.
Present shortages and recommendations for governmental actions to help alleviate them. (A4, Pb, Zn)

39-A. The Ozonation of Cyanide Wastes. Richard G. Tyler, William Maske, Willard Matthews, and M. J. Westin. *Proceedings of the Sixth Industrial Waste Conference,* Nov. 1951, p. 64-69.
Efficiency of the process is improved by holding the pH at the beginning of the treatment to 11.0-12.0 so that oxidation to cyanate becomes complete before pH drops below 8.0. Plastics, wood, Al, Cu, stainless steel, and black iron protected by asphaltic enamel or paint were shown to withstand oxidation by ozone.
(A8, R2, L26, Al, Cu, SS, CI)

The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

40-A. Treatment of Chromium Wastes by Ion Exchange. Richard G. Tyler, William Maske, and Milton J. Westin. *Proceedings of the Sixth Industrial Waste Conference,* Nov. 1951, p. 135-140.
An investigation of the process. Effect of this treatment on controlling stream pollution. (A8, Cr)

41-A. Removal of Cations From Chromic Acid Solutions. D. M. Stromquist and A. C. Reents, *Proceedings of the Sixth Industrial Waste Conference,* Nov. 1951, p. 181-189.
Removal of cations in order that chromic acid bath life may be prolonged and that costly disposal treatment may be avoided. Data are graphed. (A8, L17, Cr)

42-A. Handling of Metal Bearing Wastes at Erie, Pennsylvania. John W. Townsend. *Proceedings of the Sixth Industrial Waste Conference,* Nov. 1951, p. 292-303.
Presents basic design data and a description of two waste treatment plants now under construction at the Erie Works of General Electric Co. as well as the problems involved in the collecting of the various spent acids and metal-bearing and cyanide rinse waters, and conveying the same points for subsequent neutralization and treatment prior to discharging into Lake Erie. (A8)

43-A. Cyanide Disposal After Plating Cycle. C. F. Hauri. *Proceedings of the Sixth Industrial Waste Conference,* Nov. 1951, p. 320-323.
As experienced by the Delco-Remy Division of G. M. Corp., Anderson, Ind. (A8, L17)

44-A. Purification of Wastes in a Metalworking Plant by Lagooning. Charles R. Griffith. *Proceedings of the Sixth Industrial Waste Conference,* Nov. 1951, p. 421-433.
Lagooning of metalworking wastes is, in one case at least, a successful method to produce at a low cost an effluent that meets the requirements of most states. Graphs. (A8)

45-A. How To Do Business Under Government Controls. *Steel,* v. 130, Jan. 7, 1952, p. 127-137, 518, 520, 522, 525, 526.
Digests of production controls affecting the metalworking industry. (A4)

46-A. 1952 Metalworking Facts and Figures. *Steel,* v. 130, Jan. 7, 1952, p. 167-214.
Statistics on raw materials all the way through the end products of the metal consuming industries. Includes such related subjects as labor, prices, and earnings. (A4)

47-A. Bibliography on Titanium. Jean Richards Carpenter and Gwendolyn Werth Luttrell. *U. S. Geological Survey,* Circular 87, Jan. 1951, 19 pages. (Z5524.T6 C22b)

Includes the more significant publications on Ti issued to Jan. 1, 1950. One or two important papers issued since that date have been added. The papers are listed by issuing organizations—Federal and State Bureaus—and by various groups of publications—books and scientific and industrial journals. (A10, Ti)

48-A. The Aluminum Situation. J. H. DeKlyn. *Wire and Wire Products,* v. 26, Dec. 1951, p. 1137-1139, 1191-1193.

Economic analysis. Statistics and predictions. (A4, Al)

49-A. Nonferrous Metals in the 6-Year Plan. (In Polish.) Boleslaw Chudzio. *Hutnik,* v. 17, Nov.-Dec. 1950 p. 406-410.

Developments planned for the next six years in Poland. Includes plans for development of native Sn-Pb, Cu, and Ni ores; beneficiation and smelting problems; refining and fabrication problems; rolling; and training programs.
(A4, B general, C general, F23, EG-a)

50-A. Metals Industry. I. E. Campbell. *Chemical and Engineering News,* v. 30. Jan. 7, 1952, p. 34-36.

Reviews economic and technical developments of 1951 under the headings: Ti, Zr, Mo, V, Cr, Al, Mg, Cu, Sn, Ni, Co, iron and steel, and ceramic-metal combinations.
(A4, A general)

51-A. Markets—Trends and Prices. *Engineering and Mining Journal,* v. 153, Jan. 1952, p. 68-69.

Tabulated data and brief discussions on prices and output for major metals, miscellaneous metals, ores, and minerals. (A4)

52-A. Chemical and Metallurgical. *General Electric Review,* v. 55, Jan. 1952, p. 50-53.

An illustrated review of 1951 General Electric developments in above fields. (A general)

53-A. The Zinc Consumer Industry, 1949-51. B. Walters. *Metallurgia,* v. 44, Dec. 1951, p. 295-298.

Emphasizes making the best use of the metal available, and thus releasing further supplies for possible future uses. 14 ref. (A4, Zn)

54-A. (Book) **Accident Prevention Manual for Industrial Operations.** Ed. 2, unpaged. 1951. National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.

A comprehensive source of guides to industrial safety. Chapters take up specific groups of equipment or types of hazards. (A7)

55-A. (Book) **Proceedings of the Sixth Industrial Waste Conference.** 524 pages. Nov. 1951. Purdue University, Lafayette, Ind. (Engineering Extension Dept., Series 76.)

Forty-nine papers by various authors on the treatment of waste material. Included are treatment of cyanide waste, Cr waste disposal by ion exchange, and handling of metal-bearing wastes. Selected individual papers are abstracted separately. (A8)

56-A. (Pamphlet) **Thirtieth Annual Report for the Year Ending June 30th, 1951.** Oct. 1951, 24 pages. British Cast Iron Research Association, Alvechurch, Birmingham, England.

A brief survey of research work carried on by the organization. (A9, CI)

57-A. (Pamphlet) **Tube Laboratory Manual.** 1951, 98 pages. Massachusetts Institute of Technology, Research Laboratory of Electronics, Cambridge, Mass.

A manual of procedures used in tube development at M.I.T. Degreasing and cleaning of metal and other tube parts, electroplating Ni, Cu, Ag, Au, Pt, and stainless steel, hydrogen brazing and heat treatment, and various tube laboratory procedures. General information on materials used is given in tabular form. (A9)

B

RAW MATERIALS AND ORE PREPARATION

38-B. Lithium and Its Compounds; A Staff-Industry Collaboration Report. Rodney N. Hader, Richard L. Nielsen, and Myron G. Herre. *Industrial and Engineering Chemistry,* v. 43, Dec. 1951, p. 2636-2646.

History and occurrence; derivation of Li_2CO_3 and other Li products from spodumene ores. Future plans. 26 ref. (B general, Li)

39-B. Raw Material Availability. A. C. Byrns and Fred Lohse. *Industrial and Engineering Chemistry,* v. 63, Dec. 1951, p. 2650-2656.

Petroleum and natural gas, coal, sulfur, inorganic salts, metallic ores, minerals, forest, and agricultural products in the West. (B10)

40-B. The Production of High Temperatures in Industry by Town Gas. R. F. Hayman. *Gas Times,* v. 69, Nov. 30, 1951, p. 319-321, 324.

Previously abstracted from *Gas World.* See item 22-B, 1952. (B18)

41-B. Size Reduction: Comminution Theories, Recent Research, Design Improvements, Special Techniques. R. V. Riley. *International Chemical Engineering & Process Industries,* v. 32, Dec. 1951, p. 577-581.

67 references. (B13)

42-B. The Effect of High Clay Content in Furnace Slags. (In German.) Hans Schrader. *Archiv für das Eisenhüttenwesen,* v. 22, Sept.-Oct. 1951, p. 275-282.

Reasons for increased viscosity of slags with high clay content and methods for alleviating disadvantages arising from this condition. Origin of high clay content; its influence on desulfurization of ferrous metals. (B21, D general, Fe)

43-B. Characteristics of the Development of the Industrial Use of Gas. (In German.) Walter Litterscheidt. *Gas- und Wasserfach,* v. 92, Oct. 31, 1951, p. 260-268.

Gas-fired furnaces; utilization of flue gases; treatment of metals with gases. (B18)

44-B. Control Methods for Sinter. *Metal Progress,* v. 60, Dec. 1951, p. 116, 118, 120. (Condensed from "Testing of Sinter," E. G. Hill and Robert E. Powers.)

Previously abstracted from *American Iron and Steel Institute,* Preprint, 1951. See item 137-B, 1951. (B16, Fe)

45-B. Computation of Mill Recovery. C. C. Dell. *Bulletin of the Institution of Mining and Metallurgy,* Dec. 1951; *Transactions,* v. 61, pt. 3, 1951, p. 101-104.

Formula and chart for determining recovery in beneficiation of ores. (B14)

46-B. The Production of High Temperatures in Industry by Town Gas. *Coke and Gas,* v. 13, Dec. 1951, p. 431-434. (A condensation.)

Previously abstracted from paper by R. F. Hayman in *Gas World.* See item 22-B, 1952. (B18)

47-B. Ion-Exchange Separation of Hafnium and Zinconium. I. E. Newnham. *Journal of the American Chemical Society,* v. 73, Dec. 1951, p. 5899.

Indicates a possible method for use in ore beneficiation. (B14, Zr, Hf)

48-B. Demagnetization of Magnetite. Henry E. Hartig, Nordahl I. Onstad, and Norman J. Foot. *Mines Experiment Station, University of Minnesota,* Information Circular 7, May 1951, 22 pages.

Some results of a study of the magnetic properties of the oxides of iron. Continuous processing of magnetic ores at the Mines Experiment Station. Includes flow diagram and tables. (B14, P16, Fe)

49-B. The Distribution of Radioactivity. C. F. Davidson. *Mining Magazine,* v. 85, Dec. 1951, p. 329-340.

Surveys radioactive mineral resources of the accessible crust of the earth. 26 ref. (B10, EG-h)

50-B. Fuel Economy. IV. Furnace Efficiency. R. J. Sarjant. *Research,* v. 4, 1951, p. 562-568.

Fuels and firing, mechanization, instrumentation, and heat recovery appliances. Diagrams. 16 ref. (B18)

51-B. The Geography of Steel. George H. T. Kimble. *Scientific American,* v. 186, Jan. 1952, p. 44-53.

General account of the raw-materials situation throughout the world. Explains in simple terms how steel is made.
(B10, D general, ST)

52-B. Studies of Recovery Processes for Western Uranium Bearing Ores. III. The Recovery of Uranium and Vanadium From Ac Leach Liquors of Carnotite Ores. C. F. Coleman *U. S. Atomic Energy Commission,* AECD-3238, Nov. 25, 1949, 38 pages.

A series of studies was made using reagents which were known to precipitate U or V. These included, besides hydrolytic precipitation, arsenate, vanadate, and peroxide for uranyl ion; fluoride, oxalate, and p-toluenesulfinate for uranous ion; Fe^{++}, Fe^{+++}, and Pb for vanadate; and phosphate for vanadic ion. Data are tabulated. (B14, U, V)

53-B. Studies of Recovery Processes for Western Uranium-Bearing Ores. V. L. Saine and K. B. Brown, *U. S. Atomic Energy Commission,* AECD-3241, Oct. 14, 1949, 127 pages.

Factors influencing the recoveries of U and V by the salt-roast, acid-leach process. The direct acid-leaching of western ores. (B14, U, V)

54-B. Mineral Forecast. Edward Steidle. *Engineering Experiment Station News,* (Ohio State University), v. 23, Oct. 1951, p. 5-6, 30-37.

Production and consumption trends of mineral products. Demand, supply, resources and availability. Stresses the basic energy problem with the aim of stimulating long-range planning by those directing research programs. (B10, A4)

55-B. Lean Ores; Methods of Beneficiation in Germany. A. E. Lance. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 565-572.

Treatment of iron ores prior to dispatching them to the steel works. (B14, Fe)

56-B. First Free State Gold Mill. *Mining World,* v. 14, Jan. 1952, p. 31-36, 39.

The St. Helena Gold Mines Ltd's. new 80,000-ton-per-month plant now in operation. Includes grinding operations, extraction of Au, Ag, and Zn; and tailing disposal. Flow sheet. (B13, B14, Au, Ag, Zn)

57-B. Ore Potentials For an Expanding Steel Industry. R. G. Paul. *Western Machinery and Steel World,* v. 42, Dec. 1951, p. 89-91.

Trends in the iron and steel industry as regards ore resources. Exploration and development of new ore sources at home and in foreign countries. (B10, Fe, ST)

58-B. Metallurgical Practice at Golden Manitou. D. A. Livingstone. *Canadian Mining and Metallurgical Bulletin,* v. 45, Jan. 1952, p. 16-26;

Transactions of the Canadian Institute of Mining and Metallurgy, v. 55, 1952, p. 15-25.

Golden Manitou Mines, Ltd., in northwestern Quebec, is presently milling, at the rate of 1000 tons daily, a relatively complex sulfide ore and producing, in decreasing order of value, Zn, Ag, Au, Pb, and Cu. The products are a Zn concentrate, a Pb-Ag-Cu concentrate, and Ag-Au precipitate from cyanidation. Flow-sheet developments from the commencement of operations in 1942; reasons for making numerous changes; the shortcomings of the various schemes tried; and present-day practice.
(B13, B14, Zn, Ag, Au, Pb, Cu)

59-B. The Aqueous Oxidation of Pyrite. James F. Stenhouse and W. M. Armstrong. *Canadian Mining and Metallurgical Bulletin,* v. 45, Jan. 1952, p. 49-53; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 48-52.

Oxidation of pyrite in caustic solutions under oxygen pressure was investigated by measuring the effect of reaction variables on O_2 consumption by the reactions. From the results, a model for the process is proposed. Application to leaching of sulfide ores is suggested. (B14)

60-B. Titanium—A Critical Review With Special Reference to the Utilization of South African Resources. J. J. Frankel, A. M. Schady, and D. J. Du-Pleissis. *Journal of the Chemical, Metallurgical & Mining Society of South Africa,* Sept. 1951, p. 39-52; disc., p. 52-57.

Location and nature of overseas titanium deposits, methods of processing the ore, and new metallurgical developments Possible utilization of South African Ti resources. 66 ref. (B10, C general, Ti)

61-B. Beneficiation of the Fines From the Dogger-Ore Resources of Kahlenberg. (In German.) Georg Sengfelder. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 4, Oct. 1951, p. 374-377.

Experiments made to concentrate iron ore less than 10 mm. in particle size by the dry magnetic beneficiation method, in which the ore is ground and separated into CaO-rich and Fe-rich concentrates. Flow charts and diagrams. (B14, Fe)

62-B. (Book) **Poverkhnostnoe Besplamennol Gorenie** (Flameless Surface Combustion.) M. B. Ravich. 355 pages. 1949. Academy of Sciences of the U.S.S.R. Moscow and Leningrad, U.S.S.R.

Results of research performed in the fuel and combustion laboratories of G. M. Krzhizhanovskii's Power Institute of the Academy of Sciences and also in other research organizations. Flameless combustion of natural and compressed gases and their properties and possible spheres of application. Influence of various refractories on the process is discussed. Applications in industry, including miscellaneous metallurgical processes. Numerous graphs and diagrams. 399 ref. (B18)

C

NONFERROUS EXTRACTION AND REFINING

11-C. Electrolytic Refining of Copper From Ammoniacal Cuprous Salt Solutions. Fred A. Schimmel. *Industrial and Engineering Chemistry,* v. 43, Dec. 1951, p. 2943-2948.

Explores the possibility of refining copper using an ammoniacal electrolyte. With a given amount of electricity, twice as much Cu can be refined as with the customary H_2SO_4 process. This process seems particularly adapted to the winning of Cu from Cu-containing solutions. (C23, Cu)

12-C. The Aluminium Industry. T. G. Pearson. *Chemistry & Industry,* Nov. 17, 1951, p. 988-997.

Development of the industry. Methods of production of Al from its ores. 34 ref. (C general, B14, Al)

13-C. Refining Secondary Copper Alloys. Marvin Glassenberg, L. F. Mondolfo, and A. H. Hesse. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 465-471; disc., p. 471.

Previously abstracted from Preprint 65. See item 60-C, 1951. (C21, A8, Cu)

14-C. Refining of Aluminum-Silicon Alloys. (In French.) Louis Grand. *Fonderie,* Oct. 1951, p. 2625-2635.

Use of Na in low-temperature refining. Refining influences of Na and other elements. 15 ref. (C4, Al, Si)

15-C. Kinetics of the Reduction of Copper-Tin Alloys in a Stream of Hydrogen Chloride. (In German.) Peter Treadwell and W. D. Treadwell. *Helvetica Chimica Acta,* v. 34, Oct. 15, 1951, p. 1723-1731.

Determination of reaction equilibria of Cu and Sn with HCl according to the flow and circulation methods. Characteristic maxima of reaction rates were observed in the range of the intermetallic compounds Cu_6Sn_5, Cu_3Sn, and Cu_3Sn_8. 18 ref. (C4, Cu, Sn)

16-C. Electrolysis in Phosphate Melts. IV. Electrolysis of Oxides of Vanadium, Columbium, and Tantalum in Phosphate Melts. (In German.) Hellmuth Hartmann and Werner Mässing. *Zeitschrift für anorganische und allgemeine Chemie,* v. 266, Oct. 1951, p. 98-104.

Results of experiments, conducted to determine the feasibility of obtaining the pure metals in this way. 12 ref. (C23, V, Cb, Ta)

17-C. Facilitating the Reduction of Metal Compounds by Alloy Formation and Accompanying Calculations. (In German.) N. G. Schmahl. *Zeitschrift für anorganische und allgemeine Chemie,* v. 266, Oct. 1951, p. 1-29.

Examples show that various metal compounds are more readily reduced by alloying them with other metals, thus reducing the pressure of decomposition or altering their equilibrium constants. 36 ref. (C general)

18-C. Contributions to the Chemistry of Columbium and Tantalum. (In German.) **V. Preparation of Titanium and Tin-Free Columbium and Tantalum.** Harald Schäfer, Lisel Bayer, and Christel Pietruck. **VI. Separating Columbium and Tantalum by Reducing the Columbium Pentachloride.** Harald Schäfer and Christel Pietruck. *Zeitschrift für anorganische und allgemeine Chemie,* v. 266, Oct. 1951, p. 140-160.

Review of literature and description of experiments. 52 ref. (C general, Cb, Ta)

19-C. Production of Titanium Metal. *Light Metal Age,* v. 9, Dec. 1951, p. 20.

Photographs showing highlights of the process for reduction by Mg in a pilot plant of the U. S. Bureau of Mines at Boulder City, Nev. (C26, Ti)

20-C. Forum on Technical Progress: Metals Production. *Steel,* v. 130, Jan. 7, 1952, p. 221-224, 227, 230, 232, 234, 237.

Brief discussions by men from industry on the present situation and anticipations for 1952. (C general, D general)

21-C. Reduction of Zinc Ores in Vertical Retorts. Karol Kotlarczyk. (In Polish.) *Hutnik,* v. 17, Nov.-Dec. 1950, p. 427-434.

Details of the New Jersey Zinc Co. process. Diagrams. 15 ref. (C21, Zn)

22-C. Independent Extruder Casts His Own Billet. *Modern Metals,* v. 7, Dec. 1951, p. 38, 40.

A melting, holding, and casting installation for the production of Al extrusion billets. (C5, E10, Al)

23-C. Electrolytic Preparation of Titanium. G. D. P. Cordner and H. W. Worner. *Australian Journal of Applied Science,* v. 2, Sept. 1951, p. 358-367.

Some exploratory experiments in which Ti powder was electrodeposited from a molten mixture of $TiCl_3$ with LiCl and KCl. The cathode deposit was a fine, dendritic form, comparable with that of metal produced by the reduction of $TiCl_4$ with Mg. 10 ref. (C23, H10, Ti)

24-C. Systematizing the Copper Production Process and Electrothermal Lead Production at the Smelting Plant in Ronnskar, Sweden. (In German.) Olov Herneryd. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 4, Nov. 1951, p. 412-418.

Means applied to increase efficiency of Cu and Pb production. A photograph, diagrams, and tabular data. (C23, Cu, Pb)

D

FERROUS REDUCTION AND REFINING

31-D. Multiple Burners in Open Hearth Furnaces. H. T. Watts. *Iron and Steel Engineer,* v. 28, Dec. 1951, p. 102-107.

Variables affecting performance. Various burner designs. (D2)

32-D. Jet Tapper Practice at the Open Hearth. A. Robert Almeida and Harold Walker. *Iron and Steel Engineer,* v. 28, Dec. 1951, p. 108-109. (A condensation)

Some operating results obtained at Republic Steel Corp., Warren, Ohio. Advantages of using this explosive charge. (D9, D2)

33-D. Ladle Refractories and Practice in Acid Electric Steel Foundry. Clyde H. Wyman. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 546-553; disc., p. 553-554.

Previously abstracted from Preprint 64. See item 173-D, 1951. (D9)

34-D. The Testing of Steelplant Refractories. *Refractories Journal,* Nov. 1951, p. 459-463.

Problems encountered. Data on blast furnaces, openhearth furnaces, reheating furnaces, and soaking pits. (D1, D2, F21)

35-D. Recent Technical Progress in Basic Steel Furnace Refractories. Part III. F. I. Cordwell. *Refractories Journal,* Nov. 1951, p. 467-475.

Chemical composition of dolomite. Work done to obtain a dolomite inert to the humidity of the air and to recarbonation. (D5, B19)

36-D. Oxygen-Carbon Equilibrium in Steel. (In French.) M. Rocquet. *Circulaire d'Informations Techniques,* v. 8, Nov. 1951, p. 1265-1279.

A comparison of various results obtained in the openhearth and an examination of different methods for determining the amount of O_2 in steel. 14 ref. (D2, S11, ST)

37-D. Contribution to the Metallurgy of Chromium in Basic Steelmaking Processes. (In German.) Erwin Plöckinger. *Archiv für das Eisenhüttenwesen,* v. 22, Sept.-Oct. 1951, p. 283-293.

A review on the basis of the literature. Data are compared and systematized. 32 ref. (D2, D3, D5, ST)

38-D. The Blowing Losses in Smoke From Basic Lined Converters. (In German.) Werner Pepperhoff and Franz Zirm. *Archiv für das Eisenhüttenwesen,* v. 22, Sept.-Oct. 1951, p. 295-297.

An optical method for determining the amount of iron lost in brown converter smoke. Details of the tests, done with an electron microscope. Vapor pressure and absorption capacity of iron were investigated. 10 ref. (D3, ST)

39-D. Bottom Casting of Ingots for the Manufacture of Plates. T. T. Watson. *Blast Furnace and Steel Plant,* v. 39, Dec. 1951, p. 1471-1475, 1491.

Hazards in the practice that must be avoided, such as break-outs and defective refractories. (D9, ST)

40-D. Multiple Burners in Open Hearth Furnaces. H. T. Watts. *Blast Furnace and Steel Plant,* v. 39, Dec. 1951, p. 1484-1491.

Variables which affect operation. Performance data and diagrams. (D2, ST)

41-D. Steel Flows From Jones & Laughlin's $70,000,000 Open Hearth Furnace Addition. *Blast Furnace and Steel Plant,* v. 39, Dec. 1951, p. 1492-1495.

Features of the new plant include latest developments in openhearth-furnace design and use of refractories, instrumentation for high efficiency in the control of temperatures, heat and efficiency of fuel utilization, mechanized material, handling facilities; provisions for using tar, oil or gas for fuel; and special facilities for the handling of scrap metal. (D2, ST)

42-D. Oxygen as a Means of Increasing Bessemer Production. II. (Concluded.) W. G. McDonough. *Industrial Heating,* v. 18, Dec. 1951, p. 2211-2212, 2214, 2218.

Experiences of National Tube Co., McKeesport, Pa. Experimental oxygen blows, involving such factors as varying oxygen volume, rate of flow and time of input. Tables and graphs. (D3, ST)

43-D. $CaCN_2$—a Useful Ladle Addition. A. M. White. *Metal Progress,* v. 60, Dec. 1951, p. 79-80.

Probably the largest application is for tinplate where N_2 causes increased temper hardness with less cold reduction. (D9, ST)

44-D. Carbon Lining for Blast Furnaces. *Metal Progress,* v. 60, Dec. 1951, p. 106, 108. (Condensed from the Evolution of the All-Carbon Blast Furnace. J. H. Chesters, E. D. Elliott, and J. Mackenzie.)

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 150-D, 1951. (D1, ST)

45-D. Some Practical Aspects of Recent Developments in Open Hearth Furnace Design and Operation. A. H. Leckie. *West of Scotland Iron and Steel Institute Journal,* v. 57, 1949-50, p. 21-50; disc., p. 51-62.

Results of recent research. Principles of design of flues and regenerators. Factors governing port design. Melting chamber design, with instruments and furnace operation, and brief mention of basic roofs and oxygen. 19 ref. (D2, ST)

46-D. The Relationship Between Carbon Deposition and Reducibility. J. M. McLeod. *West of Scotland Iron and Steel Institute Journal,* v. 57, 1949-50, p. 242-253.

Carbon deposition and reducibility of iron ores and sinters under conditions similar to those in the blast furnace were investigated. Carbon-deposition ranges for some ores and sinters and variation in amount of deposited carbon with varying CO/CO_2 ratios were determined. Carbon deposition is at a maximum with easily reduced ores or sinters. Results are graphed. (D1, Fe)

47-D. Determination of Strength of Graphite Stoppers Used in Bottom Pouring. (In Czech.) O. Kallauner. *Hutnické Listy,* v. 6, Oct. 1951, p. 494-495.

Various methods of compression testing. Proposes a standard test for this type of stoppers. (D9)

48-D. Mineralogical Investigations on Basic Openhearth Slags. (In Polish.) Jerzy Zieba. *Tutnik,* v. 17, Nov.-Dec. 1950, p. 410-415.

Evaluates two methods. Results are tabulated and illustrated for each of the phases present. Photomicrographs. (D2, ST)

49-D. Comparative Tests on the Applicability of Materials for Pouring Ladles. (In Italian.) Giuseppe Ziliani and Giuseppe Grungo. *Metallurgia Italiana,* v. 43, Nov. 1951, p. 476-481; disc., p. 481-482.

Because of the presence of free quartz in standard refractories, resulting in their low chemical resistance to molten steel, use of chamotte refractories is proposed. When steel contains a normal content of Mn, refractories with a low content of Al may be used with good results. (D9, B19, ST)

50-D. Hydrogen as a Reducing Agent. Carle R. Hayward. *Engineering and Mining Journal,* v. 153, Jan. 1952, p. 85-87.

Various methods of reduction of metals by H_2. Emphasis is on Fe, but brief mention is also made of Ni and Sn.
(D general, C general, Fe, Ni, Sn)

51-D. Ten-Ton Ingot Moulds; A Comparison of Design and Conditions of Use. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 608-614; disc., p. 639-644.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 152-D, 1951. (D9, ST)

52-D. Ingot Heat Conservation; Mould Temperature Measurements. R. T. Fowler and J. Stringer. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 606-608; disc., p. 639-644.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 151-D, 1951. (D9, S16, ST)

53-D. High Purity Iron; Production on a 25-lb Scale. B. E. Hopkins, G. C. H. Jenkins, and H. E. N. Stone. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 614-616.

Previously abstracted from *Journal of the Iron and Steel Institute,* See item 286-D, 1951. (D8, Fe)

54-D. Ingot and Mould; The Process of Gap Formation. E. T. Linacre. *Iron & Steel,* v. 25, Jan. 1952, p. 3-7, 16.

Results of an attempt to establish the nature of the process of gap-formation, so as to provide a basis for calculations of the heat flow from ingot to mold; metallurgical consequences of the phenomenon. The existing evidence and some calculations in this report suggest that with a 3-ton ingot, gap-formation starts at the bottom about 3 min. after teeming and is later in a highly alloyed steel ingot. It seems probable that the ingot surface quality and the mold life are affected by the way the gap forms, but there has been little attempt to control the process. 39 ref. (D9, ST)

55-D. Basic O. H. Steel; Calculating the Furnace Charge for Consistent Output. J. R. Cuthbert. *Iron & Steel,* v. 25, Jan. 1952, p. 20-24.

A method for calculation which takes into account the varying composition of the ingoing materials and compares actual charge weights and furnace performances with the figures obtained. (D2, ST)

56-D. Blast Furnace Practice. I. Operating Theories. II. Thermal Requirements of Shaft. III. Hearth and Bosh Reactions. Charles E. Agnew. *Steel,* v. 129, Dec. 10, 1951, p. 102, 104, 106, 109; Dec. 24, 1951, p. 66-67, 70, 72; Dec. 31, p. 62, 64-65.

The efficient control of thermal economy. Importance of gas flow through the stack. Why thermal conditions in the bosh exert a major influence on fuel consumption and productivity of the stack. (To be continued) (D1)

57-D. The Operation of Hot-Blast Stoves With Waste-Gas Circulation. (In German.) Arthur Rein and Oskar J. Stebel. *Stahl und Eisen,* v. 71, Nov. 22, 1951, p. 1310-1313; disc., p. 1313-1314.

Design data. Maximum hood temperature was determined. The equipment and its operation. Compares operation with and without waste-gas circulation. (D1, ST)

58-D. Graphite Plugs for Ingot-Mold Bottoms. (In German.) Erich Boeckers. *Stahl und Eisen,* v. 71, Nov. 22, 1951, p. 1314-1316.

Results of American and German investigations. Shows that completely graphitized material is superior. Avoidance of formation of refractory inclusions. (D9)

59-D. Lining of Blast Furnaces With Carbon Bricks. (In German.) Alfred Send. *Stahl und Eisen,* v. 71, Dec. 6, 1951, p. 1361-1365; disc., p. 1365.

Development from the carbon-brick-lined hearth to the all-carbon blast furnace. Results of investigation of the durability of German and British carbon bricks. Application to the stack. Schematic diagrams. (D1, ST)

60-D. (Book) **Surface Defects in Ingots and Their Products.** Iron and Steel Institute, 4 Grosvenor Gardens, London S.W.1, England. 25s.

Covers steel ingots and their products. Small line drawings, give additional information as to the location of the defects in the mass. (D9, ST)

E

FOUNDRY

51-E. Induction and Gas Furnace Melting Costs Compared. Stewart C. Parker. *Iron Age,* v. 168, Dec. 27, 1951, p. 62-65.

The use of low-frequency induction furnaces and gas furnaces in the die-casting industry. Commercial types; cost and operational data are tabulated. (E13)

52-E. For Standard Parts as Well as "Specials" Costs Are Slashed by Investment Casting. *Precision Metal Molding,* v. 9, Dec. 1951, p. 25-26.

Production of several small components of aircraft and ordnance instruments by investment casting. Parts were cast from 18-8 stainless steel, SAE 1020 steel and Al alloy. (E15, T8, ST, Al)

53-E. Simplified Production Scheduling of Small Metal Parts With Die Casting. *Precision Metal Molding,* v. 9, Dec. 1951, p. 27-28, 71.

Production of electrical connectors from an Al alloy. Some mechanical properties of this die-cast Al alloy are given. (E13, Q general, Al)

54-E. Special Weaving Machine Redesigned to Use Investment Castings. *Precision Metal Molding,* v. 9, Dec. 1951, p. 33-35, 61-64.

Production of the machine. Major parts were cast from steel. Corrosion resistant Be-Ni was used for small parts. (E15, T10, ST, Ni)

55-E. Three Typical Uses of Die Castings. *Precision Metal Molding,* v. 9, Dec. 1951, p. 36-37, 42.

Use of die-cast components for the consumer, in industry and for the military. Parts are cast from Zn and Al. (E13, T general, Zn, Al)

56-E. Porous Castings Impregnated by Pressure and Vacuum. *Compressed Air Magazine,* v. 56, Dec. 1951, p. 332.

A method of treating a large number of castings in an autoclave by a combination of vacuum and air pressure. Sequence of operations making up the complete impregnation cycle. (E25)

57-E. Some Thermal Considerations in Foundry Work. Victor Paschkis. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 7-19.

Impressions of a heat-transfer man regarding foundry problems. Heat problems in the foundry, methods of making thermal studies, and thermal studies with the heat and mass flow analyzer. 20 ref. (E general)

58-E. Basic Cupola Melting and Its Possibilities. E. S. Renshaw. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 20-27.

Previously abstracted from Preprint 41. See item 290-E, 1951. (E10, CI)

59-E. Modification of Aluminum-Silicon Alloys. R. H. Dyke. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 28-33; disc., 33-34.

Results of a comparison of various modification techniques. Alloys investigated contained 10-12% Si. Aluminum and silicon themselves were also studied. Effectiveness of several rapid tests to determine whether or not a melt had been successfully modified. 24 ref. (E25, Al, Si)

60-E. An Investigation of the Penetration of Steel Into Molding Sand. Holger Pettersson. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 35-54; disc., 54-55.

Previously abstracted from Preprint 61. See item 293-E, 1951. (E25, CI)

61-E. Chill Tests and the Metallurgy of Gray Iron. D. E. Krause. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 79-90, disc., 90-91.

The design and application of chill tests for the control of the quality of gray iron castings. Chill tests appear better suited to very soft irons than wedge tests, whereas the latter are better adapted to the harder irons. Influences of composition of the iron, melting practice, and ladle additions on the chilling tendencies of gray iron. 12 ref. (E25, CI)

62-E. Scab Defect on Gray Iron Castings. V. M. Rowell, chairman. *Transactions of the American Foundrymen's Society,* v. 59, p. 99-106; disc., p. 106-107.

Previously abstracted from Preprint 23. See item 284-E, 1951. (E19, CI)

63-E. Metal Penetration. S. L. Gertsman and A. E. Murton. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 108-115; disc., p. 115-116.

Previously abstracted from Preprint 16. See item 278-E, 1951. (E25)

64-E. Sieve Analyses of Silica Sands. A. I. Krynitsky and F. W. Raring. *Transactions of the American Foundrymen's Society,* v. 59, p. 117-120.

Previously abstracted from *American Foundryman.* See item 401-E, 1950. (E18)

65-E. Oxidation-Reduction Principles Controlling the Composition of Molten Cast Irons. Part I and II. R. W. Heine. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 121-137; disc., p. 137-138.

Previously abstracted from Preprint 18. See item 280-E, 1951. (E10, CI)

66-E. Melting Aluminum- and Magnesium-Base Alloys. Part I. Melting Practice for Aluminum-Base Alloys. Part II. Melting Practice for Magnesium-Base Alloys. L. W. Eastwood. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 139-150; disc., p. 150.

Previously abstracted from Preprint 32. See item 289-E, 1951. (E10, Al, Mg)

67-E. Recent Advances in Dielectric Core Baking. J. Wesley Cable. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 159-168; disc., p. 168-170.

Developments in the electrical circuits of dielectric core baking units to improve the operating characteristics of the equipment. (E21)

68-E. The Contribution of Riser and Casting End Effects to Soundness of Cast Steel Bars. H. F. Bishop, E. T. Myskowski, and W. S. Pellini. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 171-177; disc., p. 177-180.

Nature of riser casting edge associations for bar castings of uniform section. Effects of geometry factors on thermal-gradient conditions required. (E22, CI)

69-E. Ill Effects and Usefulness of Gases in Metallurgy. E. Spire. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 201-208; disc., p. 208-209.

Theory of gas absorption in metals. The bad effects of gases like hydrogen and nitrogen for various ferrous and nonferrous metals and alloys. A type of ladle in which gases can be introduced through a porous refractory material can be used not only for degassing by inert gas flushing, but also for other metallurgical treatments when mechanical agitation is desired. 27 ref. (E25, P10)

70-E. Design of Core Boxes and Driers for Use on Core Blowing Machines. E. A. Blake. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 216-221; disc., p. 221-222.

Schematic diagrams are presented. (E21)

71-E. Determination of Metal Penetration in Sand Molds. Harold J. Gonya and David C. Ekey. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 253-260, disc., p. 260.

Variables such as static pressure, distribution, ramming, moisture content, and core setting time as factors significant in brass penetration of sand. Tests on penetration by Al alloys were also made. (E18, Cu, Al)

72-E. Core Oil Evaluation Method. A. E. Nurton, H. H. Fairfield, and B. Richardson. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 276-280, disc., p. 280-281.

Previously abstracted from *American Foundryman.* See item 272-E, 1951. (E18)

73-E. Improvement of Machinability in High-Phosphorus Gray Cast Iron. Part II. W. W. Austin, Jr., *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 282-289; disc., p. 290.

Previously abstracted from Preprint 12. See item 277-E, 1951. (E25, G17, CI)

74-E. Compaction Studies of Molding Sands. R. E. Grim and Wm. D. Johns, Jr. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 291-295; disc., p. 295.

Previously abstracted from Preprint 19. See item 281-E, 1951. (E18)

75-E. Manufacture of Bronze Boiler Drop Plugs. B. F. Kline and J. R. Davidson. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 296-299.

Previously abstracted from *American Foundryman.* See item 182-E, 1951. (E11, Cu)

76-E. Core Practice as Related to Malleable Foundry Losses. E. J. Jory. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 300-303; disc., p. 303.

Previously abstracted from *American Foundryman.* See item 184-E, 1951. (E21, CI)

77-E. Precoat Materials for Investment Casting. Wm. F. Davenport and Adolph Strott. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 315-322; disc., p. 322.

Previously abstracted from Preprint 27. See item 286-E, 1951. (E15, SS, AY, SG-h)

78-E. Importance of Slag Control in Basic Cupola Operation. R. A. Flinn and R. W. Kraft. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 323-329; disc., p. 329-331.

Analysis of previous equilibrium data for desulfurization, dephosphorization, and carburization as they affect these reactions in basic cupola operation. 10 ref. (E10, CI)

79-E. U. S. Navy Non-Ferrous Development Program. Clyde L. Frear. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 348-351, disc., p. 351-352.

Development projects described are: determination of rates of solidification of bronze castings and methods of their control; study of convection currents in molds; study of various methods of melting, molding, and pouring to eliminate defects; and application of radiography to bronze castings. (E25, S13, Cu)

80-E. Heat Flow in Moist Sand. Victor Paschkis. *Transactions of the American Foundrymen's Society,* v. 59, p. 381-390; disc., p. 390-391.

Previously abstracted from Preprint 3. See item 276-E, 1951. (E18)

81-E. Increasing Riser Efficiency. James O'Keeffe, Jr., *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 392-397.

Reviews briefly fundamental considerations in risering. Various methods which are available to increase riser efficiency and to increase product quality. 11 ref. (E22)

82-E. Die Casting Magnesium Alloys. R. C. Cornell. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 398-400; disc., p. 400.

Previously abstracted from *American Foundryman.* See item 270-E, 1951. (E13, Mg)

83-E. Modern Core Sand Practice. R. H. Greenlee. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 412-416; disc., p. 416-417.

Previously abstracted from Preprint 59. See item 292-E, 1951. (E18)

84-E. Equipment and Methods of Straightening and Dimensional Inspection of Malleable Iron Castings. Leslie N. Schuman. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 418-424; disc., 424.

Previously abstracted from Preprint 31. See item 288-E, 1951. (E24, S14, CI)

85-E. Solidification of Gray Iron in Sand Molds. R. P. Dumphy and W. S. Pellini. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 425-433; disc., p. 433-434.

Previously abstracted from Preprint 22. See item 283-E, 1951. (E25, N12, CI)

86-E. Solidification of Steel Against Sand and Chill Walls. H. F. Bishop, F. A. Brandt, and W. S. Pellini. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 435-447; disc., p. 447-450.

Previously abstracted from Preprint 21. See item 282-E, 1951. (E25, N12, CI)

87-E. Testing of Sand Under Impact. Wm. H. Moore. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 451-460; disc., p. 460-461.

Previously abstracted from Preprint 30. See item 287-E, 1951. (E18)

88-E. Refractories for Hot-Blast Cupolas. F. C. Evans. *Refractories Journal,* Nov. 1951, p. 464-465.

Previously abstracted under similar title from *Foundry Trade Journal*. See item 494-E, 1951. (E10)

89-E. Some Effects of Temperature and Melting Variables on Chemical Composition and Structure of Gray Irons. E. A. Land and R. W. Heine. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 472-487; disc., p. 487.

Previously abstracted from Preprint 47. See item 291-E, 1951. (E10, M27, CI)

90-E. Freezing of White Cast Iron in Green Sand Molds. H. A. Schwartz and W. K. Bock. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 488-492; disc., p. 492-493.

Previously abstracted from Preprint 17. See item 279-E, 1951. (E25, N12, CI)

91-E. Effect of Sand Grain Distribution on Casting Finish. H. H. Fairfield and James MacConachie. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 523-527; disc., p. 527-528.

Previously abstracted from Preprint 24. See item 285-E, 1951. (E19, Cu)

92-E. Production of Aluminium Die Castings for the Hoover Electric Cleaner. *Machinery* (London), v. 79, Nov. 29, 1951, p. 952-957.

Production, details, including the die-making procedure, at Hoover, Ltd. (a British firm.) (E13, T10, Al)

93-E. How to Successfully Cast a 3-Groove Pulley. (In French.) Guy Henon. *Fonderie,* Oct. 1951, p. 2653-2656.

Casting of pulley was described in the Jan. 1950 issue of *American Foundryman* (see item 34-E, 1950). The pulley has been tested in five foundries with generally unsuccessful results. Metallurgical aspects of the problem and an attempt to trace the difficulties. (E25, CI)

94-E. Feeders for Hand Molding. (In French.) *Fonderie,* Oct. 1951, p. 2657-2658.

A method for avoiding defects of cast iron pieces which often arise upon attachment of feeders because of the difficulties met by the molder in widening the latter sufficiently at their base. (E19)

95-E. Study of the Use of Infrared Radiation for Drying of Molds and Firing of Cores. (In French.) *Fonderie,* Oct. 1951, p. 2659-2664.

Evaluates efficiency of the above process. (E21)

96-E. Castable Outer Linings for Indirect-Arc Furnaces. C. V. Kilburn and R. W. Knauft. *American Foundryman,* v. 20, Dec. 1951, p. 34-37.

A new procedure for installing castable refractories in the outer or insulating linings of indirect-arc electric melting furnaces of 350, 500, and 700 lb. capacity. (E10)

97-E. Modern Foundry Methods Expand High Production Malleable Iron Plant. *American Foundryman,* v. 20, Dec. 1951, p. 48-51.

Procedures at Albion Malleable Iron Co., Albion, Mich. (E general, A5, CI)

98-E. Effect of Cerium on Ductility and Impact Strength of Steel. C. D. Berry and A. A. Dorvel. *American Foundryman,* v. 20, Dec. 1951, p. 45-46.

Use of cerium as a supplementary addition to steel eliminates the low ductility and low impact strength commonly encountered in dead-killed steel when Al alone is used as a deoxidizer. Ce raises ductility and impact strength by changing the shape, quantity, and distribution of nonmetallic inclusions. Data are tabulated. (E25, Q23, Q6, ST)

99-E. New Investment Casting Foundry Features Latest Techniques. John T. Andrews, Jr. *American Machinist,* v. 96, Jan. 7, 1952, p. 128-131.

Watervliet Arsenal's new investment casting foundry for production of cannon components and for laboratory experiments in the technique. (E15)

100-E. How to Seal Porous Castings. M. Jordan Nathason. *American Machinist,* v. 96, Jan. 7, 1952, p. 161, 163.

Use of thermosetting resins. Schematic diagrams. (E25)

101-E. Cast-Iron Crankshafts, With Special Reference to Acicular and Spheroidal-Graphite Cast Irons. A. B. Everest. *Foundry Trade Journal,* v. 91, Dec. 6, 1951, p. 643-650.

Cast vs. forged crankshafts and the advantages and disadvantages of cast iron for crankshafts. Development of cast irons with required mechanical properties; alloy cast irons, including acicular cast iron for crankshafts of diesel engines; test data and service performance of alloy and special cast-iron crankshafts; spheroidal-graphite cast iron and its possibilities for crankshafts. Micrographs. 12 ref. (E general, T21, CI)

102-E. Insulated Feeder Heads for Steel Castings and Ingots. H. O. Howson. *Foundry Trade Journal,* v. 91, Dec. 13, 1951, p. 683-686.

The successful use of feeder sleeves of superior insulating properties for nonferrous castings introduces the prospect of a similar application to steel castings. Trials have shown that insulating methods are applicable to steel foundry practice, resulting in improved feeding action and allowing the use of hot tops of reduced volume for steel castings and ingots. (E23, D9, CI)

103-E. Precision Casting Methods. W. H. Sulzer. *Foundry Trade Journal,* v. 91, Dec. 20, 1951, p. 699-707.

The investment casting or the "lost-wax" process. Detailed information on each stage of the process, and recommendations of the choice of materials and technique. A table gives the tensile properties of precision steel castings. (E15, ST)

104-E. Carron Mechanised Bath Foundry. Begbie McCall. *Foundry Trade Journal,* v. 91, Dec. 20, 1951, p. 709-711.

Layout of the foundry installed by the Carron Co. for the manufacture of bathtub castings. Various operations. (E11, CI)

105-E. Better Casting Methods Cut Forming Die Costs. *Iron Age,* v. 168, Dec. 20, 1951, p. 110-112.

More accurate control of shrinkage and metal solidification in production of sand-cast nonferrous forming dies through new techniques has substantially reduced grinding and labor required to bring dies to final size. (E25, T5, EG-a)

106-E. Advantages of Designing With Gray Iron Castings. C. O. Burgess. *Materials & Methods,* v. 34, Dec. 1951, p. 63-68.

Improved operational or functional quality which may be conferred on the product by use of castings, economic advantages of the casting process as a manufacturing method, and position of gray iron vs. other cast metals. (E general, CI)

107-E. What Is Fluidity? (Concluded). T. P. Yao and V. Kondic. *Metal Industry,* v. 79, Nov. 30, 1951, p. 460-462.

Data on the viscosity and spiral fluidity of Al, Sn, Zn, and Al-Ti alloys. Surface tension is also considered. (E25, P10)

108-E. Contamination of Nonferrous Foundry Melts. A. L. Simmons. *Metal Progress,* v. 60, Dec. 1951, p. 74-75.

Accidental contamination and the regular use of contaminated material. Ways of predicting mathematically the future course of such contamination. (E10, EG-a)

109-E. Effect of Titanium on Gray Iron. D. W. McDowell, Jr., *Metal Progress,* v. 60, Dec. 1951, p. 80.

How Ti produces finer graphite in cast iron and also improves machinability, heat resistance, and corrosion resistance. (E25, G17, R general, CI, Ti)

110-E. Spheroidal Graphite in Cast Iron. *Metal Progress,* v. 60, Dec. 1951, p. 156-158. (Condensed from "Crystallization of Cast Iron With Nodular Graphite," K. P. Bunin and G. I. Ivantsov.)

Previously abstracted from *Doklady Akademii Nauk SSSR.* See item 442-E, 1950. (E25, CI)

111-E. Stainless Steel Foundry Conserves Critical Alloys. Gilbert C. Close. *Steel,* v. 129, Dec. 24, 1951, p. 58-59.

How 44,000 lb. of castings per month are being produced by an integrated foundry operating on scrap generated in other parts of the plant (Solar Aircraft Co., San Diego). Several "impossible" production jobs of casting Type 321 stainless are now routine. (E general, SS)

112-E. Modern Metallurgy of Cast Iron. H. Morrogh. *West of Scotland Iron and Steel Institute Journal,* v. 57, 1949-50, p. 62-80, disc., p. 81-84.

Method of formation from the liquid state of white and gray structures, eutectic structures, fine graphite, flake graphite, and nodular graphite. (E25, CI)

113-E. Review of the More Common Foundry Defects in Aluminum Alloy Castings and Their Respective Causes. (In Italian.) Mario Barbero. *Metallurgia Italiana,* v. 43, Nov. 1951, p. 482-484. (E25, Al)

114-E. Plastics in the Metalworking Industry. *Bakelite Review,* v. 23, Jan. 1952, p. 10-12.

Applications to foundry molds, parting boards and patterns, investment casting, and forming die and drill jigs. (E17, E19, E15, G general)

115-E. How to Use the Cupola. (Concluded). Bernard P. Mulcahy. *Foundry,* v. 79, Dec. 1951, p. 250, 252; v. 80, Jan. 1952, p. 152, 155.

Influence of C, Si, and other elements on cupola metal. Concluding installment: tests for mechanical properties of cupola iron, and use of deoxidants, graphitizers, and alloy additions. (E10, Q general, CI)

116-E. Casting 100,000 Valve Seat Inserts Daily. Robert H. Herrmann. *Foundry,* v. 80, Jan. 1952, p. 76-81, 242-245.

The efficient design for mass production of specialized, high-quality, corrosion, heat and wear resistant castings in white and gray alloyed irons at Engineering Castings, Marshall, Mich. (E11, CI)

117-E. Foundry Statistics. *Foundry,* v. 80, Jan. 1952, p. 161.

Tabulated information on shipments of various types of castings and materials, production workers, coke and pig iron production and consumption, and iron and steel scrap consumption. (E general, A4)

118-E. How to Use Copper Alloys in Die Castings. L. F. Spencer. *Iron Age,* v. 169, Jan. 10, 1952, p. 90-91.

Problems involved in the high casting temperature of Cu alloys. Die design considerations. Data on mechanical properties are tabulated. (E13, Q general, Cu)

119-E. Foundry Dressing Operations; Control of Dust. R. F. Ottignon. *Iron and Steel,* v. 24, Aug. 1951, p. 389-392.

Previously abstracted from *Institute of British Foundrymen.* Paper 1008; see item 427-E, 1951. (E24)

120-E. Inoculation of Cast Iron; Use of Calcium Silicide. W. S. Williams. *Iron & Steel,* v. 25, Jan. 1952, p. 9-10, 32.

Reviews a previous article on the quasi-bessemerizing process. Advantages of this process. Methods adopted in its use. (E10, E25, CI)

121-E. Investment Casting; Money Saving Mass Producer. R. R. Miller. *Steel*, v. 130, Jan. 14, 1952, p. 58-59.

Techniques used by Precision Metalsmiths Inc. of Cleveland. (E15, Fe)

122-E. Trimming Production Costs Through Impregnation Methods. M. Jordan Nathason. *Western Machinery and Steel World*, v. 42, Dec. 1951, p. 98-100.

Reasons for porosity in metal castings, sealants in use, preventive vs. salvage impregnation, methods of impregnation, and a bonding technique employing impregnation methods. (E25)

123-E. Controlled Solidification to Cast Forming Dies Halves Grinding and Polishing Time. *Western Metals*, v. 9, Dec. 1951, p. 35-36.

Method employs bronze flexible tubing which runs through the special high-conductivity facing sand at a distance of approximately ½-in. from the mold-metal interface. Uniform cooling of the working face of the dies is possible. Material is Kirksite. (E25, Zn)

124-E. The Effect of Cupola Burn-Out on the Melting of Cast Iron With Special Reference to the Water-Cooled Cupola Furnace. (In Dutch.) G. L. Jones and Van Bergen. *Metalen*, v. 6, Nov. 15, 1951, p. 397-404.

Defines the average burn-out cross section (arithmetical average of the burn-out area above each tuyere). Three series of tests show that, by water cooling of the melting zone, it is possible to obtain minimum burn-out of the lining and produce longer melts with all the economic and metallurgical advantages of a constant inside cupola diameter. (E10, CI)

125-E. Defects in Castings; Defective Shape. (In Swedish.) J. Drachmann. *Gjuteriet*, v. 41, p. 172-175.

Second part of the list of defects in castings and their causes compiled by the Swedish Committee on Defects in Castings. (E25)

126-E. (Book). **Chill-Cast Tin-Bronzes.** D. Hanson and W. T. Pell-Walpole. 368 pages. Edward Arnold & Co., 41 Maddox St., London, W.1, England. 75s.

The metallurgy of tin bronzes, with special emphasis on the theories, researches and practices of chill casting. Recommendations on compositions, melting, pouring rate, and mold temperatures. The main treatment in the book is liberally applied to the production of sound homogeneous material in chill-cast form, notably for billets, e.g., cored and solid bushing material and ingots for subsequent working. (E general, E23, Cu)

127-E. (Book) **Directory of Steel Foundries in the United States, Canada, and Mexico.** 208 pages. 1951. Steel Founders' Society of America, 920 Midland Bldg., Cleveland 15, Ohio.

Personnel and production facilities. Producers of heat and corrosion resistant steel castings, high-Mn castings, investment-mold castings, and toolsteel castings are also included. (E general, A10, CI)

F

PRIMARY MECHANICAL WORKING

28-F. Effect of Track Time on Soaking Pit Heating. J. R. Chegwidden. *Iron and Steel Engineer*, v. 28, Dec. 1951, p. 53-57; disc., 57-58.

Through the medium of an analysis of those operations included in the measurement of track time, suggests possible ways of improvement and a more accurate means of evaluation. (F21, ST)

29-F. New Slab Shear at Rotary Electric Steel Co. E. T. Peterson. *Iron and Steel Engineer*, v. 28, Dec. 1951, p. 59-64; disc., p. 64-65.

New shear gives positive control of the slab, eliminates depressing table and shock on shear table, and features quick release of the sheared-off portion of the slab. (F29, ST)

30-F. Recent Lubricating Problems at Sparrows Point. A. E. Cichelli. *Iron and Steel Engineer*, v. 28, Dec. 1951, p. 110-120, 122; disc., p. 122.

Improved design of machine parts so that lubricants would be more effective. Some specific problems in which lubrication of machinery in rolling mills was involved. (F23)

31-F. Coating Improves Forming Operations. *Iron and Steel Engineer*, v. 28, Dec. 1951, p. 127, 129.

Tells how "Granodraw", a phosphate coating, makes possible the cold extrusion of steel. By phosphate coating steel prior to working it, drawing, extrusion and other forming operations are improved. (F1, G21, ST)

32-F. Keeping Kilowatts in Line. C. C. Roberts. *Instrumentation*, v. 5, 4th qtr., 1951, p. 22-23.

Closely controlled forging operations at Locke, Inc., Baltimore, Md., give improved grain structure and less decarburization in steel parts. Instrumentation and control systems. (F22, S18, ST)

33-F. Principles of Continuous Gauge Control in Sheet and Strip Rolling. W. C. F. Hessenberg and R. B. Sims. *Sheet Metal Industries*, v. 28, Dec. 1951, p. 1083-1090.

The mechanism by which longitudinal gage variations are produced and how they may be corrected. Two novel methods of gage control. (F23, S14)

34-F. New Heavy Forge; Opening of Large Plant at East Hecla Works. *Iron and Steel*, v. 25, Dec. 1951, p. 534-537, 559-562.

General layout. Includes heat treatment facilities. Detailed account of the furnaces. (F22, ST)

35-F. Surface Treatment for Cold Extrusion. Adolph Bregman. *Metal Progress*, v. 60, Dec. 1951, p. 76-79.

The cold extrusion process for carbon steel developed in Germany during the last war. Lubricants and phosphate coatings applied to facilitate the process. (F1, F24, CN)

36-F. Track Time and Soaking Pit Practice. *Metal Progress*, v. 60, Dec. 1951, p. 124, 128, 146, 148. (Condensed from "Steel Quality as Affected by Track Time and Soaking Pit Practice." A. F. Mohri.)

Previously abstracted from *American Iron and Steel Institute*, Preprint, 1951. See item 153-F, 1951. (F21, ST)

37-F. Forum on Technical Progress: Processing Methods. *Steel*, v. 130, Jan. 7, 1952, p. 287-290, 292, 295, 296, 298, 301-302, 304, 307, 308, 310, 313, 316, 321-322, 325, 328, 330, 332, 334, 338, 340, 342, 344, 347, 350, 352, 355-356, 359, 362, 364, 366, 369, 372, 374, 376.

Brief discussions by men from industry on the present situation and anticipations for 1952. Includes foundry practice, primary and secondary fabrication, and heat treating. (E general, F general, G general, J general)

38-F. Wire Drawing Technique and Equipment. Parts I-III. F. T. Cleaver and H. J. Miller. *Wire Industry*, v. 18, Oct. 1951, p. 893-896; Nov. 1951, p. 959, 961, 963-964; Dec. 1951, p. 1071-1073.

Part I: History and present-day practice. Diagrams and illustrations. Part II: Die materials, their maintenance and performance. Part III: Fabrication practice for Cu and other metals. Development trends. (F28)

39-F. Hadfields' New Forge: Technical Description of Plant and Equipment. *British Steelmaker*, v. 17, Dec. 1951, p. 632-636, 639-642, 645-646.

A comprehensive technical description of plant and equipment of British firm. (F22, ST)

40-F. Factors Responsible for Thickness Variations During Rolling of Sheet or Strip. (In Polish.) Zygmunt Wusatowski. *Hutnik*, v. 17, Nov.-Dec. 1950, p. 415-423.

Includes roll-pass diagrams and calculations. Factors involved, including temperature, roll-finishing operations, roll pressure, etc. 14 ref. (F23)

41-F. How to Use Copper Alloys in Forgings and Extrusions. L. F. Spencer. *Iron Age*, v. 168, Dec. 27, 1951, p. 66-69.

An evaluation of the use of Cu alloy forgings and extrusions. Data on mechanical properties of various types are tabulated. (F22, F24, Q general, Cu)

42-F. Hot and Cold Forging Methods. C. W. Hinman. *Modern Machine Shop*, v. 24, Jan. 1952, p. 140-142, 144, 146.

Equipment and methods. (F22)

43-F. Forging Magnesium. C. J. Orciuch. *Modern Metals*, v. 7, Dec. 1951, p. 54-55.

Typical forgings from the most widely used Mg alloys. (F22, Mg)

44-F. Extrusion Plus Forging Simplifies Aluminum Forming. G. W. Birdsall. *Steel*, v. 130, Jan. 14, 1952, p. 54-56.

New concepts in design and production methods for Al parts. Unique combination of extrusion and forging methods reduces metal waste 98.6%, and cuts machining 84%. Diagrams. (F22, F24, Al)

45-F. An Examination of Modern Theories of Rolling in the Light of Rolling Mill Practice. III. The Speed Effect in Strip Rolling, Gauge Control. (Continued.) N. H. Polakowski. *Sheet Metal Industries*, v. 28, Nov. 1951, p. 981-986, 992, Dec. 1951, p. 1077-1081.

Includes graphs and diagrams. (To be continued.) (F23)

46-F. Planning the Air Force Heavy Press Program; Larger Forgings Aid Aircraft Production. K. B. Wolfe. *Steel Processing*, v. 37, Nov. 1951, p. 551-554; Dec. 1951, p. 610-613.

The need for and the development to date of large horizontal extrusion machines and vertical presses. Comparison with Russia's advancement in this field. (F22)

47-F. An Investigation of Shell Forging Methods. W. Trinks. *Steel Processing*, v. 37, Dec. 1951, p. 603-609.

In each step in the hot forging of shells, from billet separation to nosing, many small details must be observed if acceptable forgings are to be made at low cost. Advantages of the cold forging method. (F22, ST)

G

SECONDARY MECHANICAL WORKING

43-G. Solving Titanium Machining Problems. *Machinery* (American), v. 58, Dec. 1951, p. 160-166.

A comparison of the mechanical and physical properties of Ti with

those of steel and other high-temperature alloys. Various cutting operations are analyzed. Results of various machinability tests.
(G17, Q general, P general, Ti, SG-h)

44-G. Cutting Speeds and Feeds for Slotting With End-Mills. Robert Corey Deale. *Machinery* (American), v. 58, Dec. 1951, p. 167-170.
Tables give the cutting speeds and feeds to be used under various conditions on hot rolled steels and cast iron. (G17, ST, CI)

45-G. Powder Cutting of Metals. Allen S. Park. *Compressed Air,* v. 56, Dec. 1951, p. 328-331.
Technique employs powdered iron in the oxygen flame thus enabling stainless steel and other hard-to-cut materials to be readily cut. (G22, SS)

46-G. The Theory of Plasticity Applied to a Problem of Machining. E. H. Lee and B. W. Shaffer. *Journal of Applied Mechanics,* v. 18, (*Transactions of the American Society of Mechanical Engineers,* v. 73), Dec. 1951, p. 405-413.
Recently developed methods of analyzing stress and strain distributions in the plane plastic flow of an ideally plastic material are applied to the problem of machining. Results of this theory are compared with published experimental results, and with other theoretical analyses. 20 ref. (G17, Q23)

47-G. Fundamental Aspects of Metal Cutting and Cutting Fluid Action. Hans Ernst. *Annals of the New York Academy of Science,* v. 53, art. 4, June 27, 1951, p. 936-961.
Results of experimental investigations and mathematical analyses. 36 ref. (G21, G17)

48-G. The Metal Cutting Process as a Means of Studying the Properties of Extreme Pressure Lubricants. Milton C. Shaw. *Annals of the New York Academy of Science,* v. 53, art. 4, June 27, 1951, p. 962-978.
The inter-relationship between the shearing and sliding phases of cutting; sliding and frictional aspects of the process. (G21, G17, Q9)

49-G. Superfine Grinding. G. Cattin. *Aircraft Production,* v. 13, Dec. 1951, p. 384-386.
The factors involved in obtaining mirror finishes and superfinishes on metal surfaces. Machines used for these operations. (G18)

50-G. Stretch-Forming. G. W. Weeks. *Aircraft Production,* v. 13, Dec. 1951, p. 393-395.
Results of an investigation on Al alloy sheet. The orange-peel effect was overcome by employing a subcritical annealing treatment. Mechanical properties of the panel after various stages of annealing are tabulated. (G9, J23, Al)

51-G. Nerve and Sharp Tools Machine *Any* Stainless at High Speeds. E. Von Hambach. *American Machinist,* v. 9, Jan. 7, 1952, p. 117-120.
Proper grinding and fine surface finish on cutting edges of tools, coolant in the right place and under plenty of pressure, rigid and husky machine tools, and lots of nerve are the requirements for greatly increasing machining speeds. (G17, SS)

52-G. How Ryan Hot Forms Titanium. *American Machinist,* v. 96, Jan. 7, 1952, p. 125.
The part is heated to medium red heat and deformed almost to completion. It is then reheated and deformation completed. No springback occurs. (G4, Ti)

53-G. Radioactive Tracers Speed Tool Life Study. E. J. Tangerman. *American Machinist,* v. 95, Dec. 24, 1951, p. 100-101. (Based on paper by M. E. Merchant and E. J. Krabacher.)
Previously abstracted from *Journal of Applied Physics.* See item 297-G, 1951. (G17, SG-h)

54-G. Plane Makers Cut Costs, Materials With Plastic Dies. *Business Week,* Jan. 5, 1952, p. 58-60, 62.
The many advantages of plastic over Zn dies for forming aircraft sheet metals. (G1)

55-G. The Grinding of Steel. *Edgar Allen News,* v. 30, Oct. 1951, p. 973-976; Nov. 1951, p. 1008-1009; Dec. 1951, p. 9-10.
A discussion on various abrasives. Factors such as influence of mechanical properties of steel, use of coolants, types of grinding equipment, and wheel design and maintenance. (To be continued.)
(G18, ST)

56-G. Vapour Blast Liquid Honing. Donald Grant. *Electroplating and Metal Finishing,* v. 4, Dec. 1951, p. 377-378, 384.
A brief recapitulation of the process. Applications. (G19)

57-G. The Effect of Mill Tolerances on the Finished Sheet Metal Stamping. Stanley R. Cope. *Finish,* v. 9, Jan. 1952, p. 21-25, 82-83.
How careful planning can hold inaccuracies to a minimum. Relation between tolerances and practical die design and tooling cost. Detailed diagrams. (G3)

58-G. Electronic Tracing Head Increases Precision Flame Cutting Volume up to 25%. *Industry & Welding,* v. 24, Jan. 1951, p. 60, 62.
How production flame cutting with an electronic tracing head that produces work to extremely close tolerances has proved to be profitable for a job welding shop. (G22)

59-G. Heating With the Acetylene Flame. *Linde Tips and Oxy-Acetylene Tips,* v. 31, Jan. 1952, p. 5-9.
How bending, straightening, and forming operations can be done with the oxy-acetylene flame. Numerous diagrams and illustrations.
(G general)

60-G. Die Life and Die Typing; German Hobbing Techniques. H. A. Wallace. *Metal Treatment and Drop Forging,* v. 18, Dec. 1951, p. 559-563, disc., p. 563-564.
Method of increasing die life and decreasing cost. Forging operations, manufacture of the hob, and effect of scale. Schematic diagrams.
(G16, F22, TS, CN)

61-G. Toy Production; Bigtime Operation on a Miniature Scale. *Steel,* v. 129, Dec. 24, 1951, p. 54-57.
The mass-fabricating metalworking techniques used to produce toys from 16, 18, 20, 22, and 24-gage prime steel. Progressive dies and power presses. Cleaning and finishing operations.
(G1, L general, T10, CN)

62-G. Eliminate Grinding Damage —Reduce Tool Failure. H. Pottle. *Steel,* v. 129, Dec. 31, 1951, p. 56-57.
Too much heat between grinding wheel and work can cause cracking and skin softening, two principal reasons for tool failure. By feeding coolant directly through the grinding wheel, actual cutting temperature can be lowered by as much as 600°. (G18, TS)

63-G. Use of Abrasives in Modern Fabrication. *Welding and Metal Fabrication,* v. 19, Dec. 1951, p. 457-462.
Factors concerning the composition and manufacture of grinding wheels. General recommendations on their use. (G18)

64-G. Powder Washing for Metal Removal. R. S. Babcock. *Welding Journal,* v. 30, Dec. 1951, p. 1092-1097.
Previously abstracted from *Canadian Metals.* See item 34-G, 1952.
(G22, CI)

65-G. New Process for Producing Holes in Hard Materials. A. Kuris. *Machinery* (London), v. 79, Dec. 6, 1951, p. 991-992.
See abstract from *Machinery* (American) item 202-G, 1951. (G17)

66-G. Discussion of Cutting With Low Pressure Oxygen. (In Russian.) S. V. Begun and S. G. Guzov. *Avtogennoe Delo,* v. 22, Apr. 1951, p. 28-29.
Above authors discuss separately two papers appearing in *Avtogennoe Delo,* v. 21, May and June, 1950. See items 281-G and 291-G, 1950.
(G22, ST)

67-G. Rockets for Bazookas. Joseph Geschelin. *Automotive Industries,* v. 106, Jan. 1, 1952, p. 34-35, 86.
Production procedures. Motor body is made from steel tubing 2.079-2.089 in. o.d. and wall thickness of 0.247 in. Machine-shop operations, heat treating, degreasing, and spray painting of component parts.
(G17, J general, L12, L26, ST)

68-G. Plastic Tooling Cuts Costs at Lockheed. *Aviation Week,* v. 56, Jan. 7, 1952, p. 42-44, 47-48.
Use of plastic tooling for forming, trimming, and drilling of Al alloy aircraft parts. Advantages.
(G general, Al)

69-G. Stampings Make Strong, Accurate Camera Parts. Herbert Chase. *Iron Age,* v. 168, Jan. 10, 1952, p. 92-94.
Stamping problems encountered in production of Ansco cameras. Dies and stamping procedure. (G3)

70-G. Bending Roll Design Analysis. E. A. Randich. *Product Engineering,* v. 23, Jan. 1952, p. 133-135.
Method for calculating data needed for the detail design of pyramid-type bending rolls. Forces acting on rolls are analyzed and equations derived for diameters of top and bottom rolls to curve plate of different widths and thicknesses. (G6)

71-G. Disintegration Becomes Production Necessity. Gene Burch. *Steel,* v. 130, Jan. 14, 1952, p. 60-62.
The ability of disintegration equipment to drill or cut hardened metal has resulted in the salvaging of millions of dollars worth of parts that would have been junked if they could not be repaired or salvaged. Developments in the field and various applications. (G17, A8)

72-G. Jet Stream Lowers Cutting Tool Temperatures. *Steel,* v. 130, Jan. 21, 1952, p. 70.
High-speed jets of oil directed from below single-point cutting tools and using a specially prepared cutting oil promise a sizable increase in either tool life or cutting speed.
(G21)

73-G. Some Outstanding European Die-Making Techniques. Federico Strasser. *Steel Processing,* v. 37, Dec. 1951, p. 614-616, 637.
Differences between American and European cutting-die design and die-building technique; features which are unusual to most American toolmakers. (G16)

74-G. Carbide Tools for Job Lot Production. Russell McLaughlin. *Tool Engineer,* v. 28, Jan. 1952, p. 52-53.
Presents a cost analysis chart to determine the economic advantages of carbide tool application.
(G17, C-n)

75-G. Cutting Fluids; Selection and Application. Robert T. Kimmel. *Tool Engineer,* v. 28, Jan. 1952, p. 61-66.
Types of fluids and their chemical compounds, storage and handling, and metal-cutting fluid recommendations. (G21)

76-G. Cold-Forming Steel Sections. R. Saxton. *Metallurgia,* v. 44, Dec. 1951, p. 285-286.
Some of the factors concerned in the production of steel sections of small cross-sectional area. Brief reference is made to the hot drawing process. (G4, ST)

77-G. Overcoming "Orange Peeling" on Stretch-Pressed Aluminium Alloy Aircraft Skinning. G. W. Weeks. *Metallurgia,* v. 44, Dec. 1951, p. 287-289.
See abstract of "Stretch-Forming" *Aircraft Production,* item 50-G, 1952.
(G9, J23, Al)

78-G. The Machinability of Alloy Steels in Connection With Fine-Finish Turning. (In German.) Gustav Wagner and Paul Wiest. *Stahl und Eisen,* v. 71, Nov. 22, 1951, p. 1317-1323.

Rapid methods for machinability testing. Results of examination of 23 alloy steels by these methods. Relative merits of the different methods. Data are charted and tabulated. (G17, AY)

79-G. (Book) **General Engineering Workshop Practice.** Ed. 2, 576 pages. 1951. Odhams Press, Ltd., Long Acre Lane, London W.C.2, England. 12s., 6d.

Ranges from bench work and machine-shop equipment to modern methods of inspection. Machining processes include turning, milling, and gear cutting. Presswork, stamping, die casting, heat treatment, welding, forging, and brazing are also covered. Numerous tables.
(G general, E13, J general, K general, F22)

80-G. (Book). **Rezhimy Rezaniia Metallov Instrumentami iz Bystrorezhushchei Stali (dlia Odnoinstrumentnoi Obrabotki)** [Conditions for Cutting Metals With High Speed Toolsteels (for Single-Point Machining.)] 339 pages. 1950. State Scientific-Technical Publishing House for Machine-Construction Literature, Moscow, U.S.S.R.

Standardizes conditions for machining ferrous and nonferrous metals and light alloys on lathes, planing machines, grooving machines, milling machines, drilling machines, screw-cutting lathes, gear-cutting machines, and broaching machines. Extensive tabular data and schematic diagrams. 66 ref. (G17)

H

POWDER METALLURGY

7-H. Powder Metal Locking Part Is Bent 4 Deg. and Assembled Under Stress to Gain Spring Action. A. L. Fabens. *Precision Metal Molding,* v. 9, Dec. 1951, p. 29, 31-32.

The part is basically of Fe-Cu composition. It is unique in that it requires properties generally considered to be the least satisfactory characteristic of molded powder parts. (H general, Fe, Cu)

8-H. Stress Resistance and Low Cost Are Built Into This Food Disposal Unit by Die Casting, Powder Metallurgy, Permanent Mold Casting. *Precision Metal Molding,* v. 9, Dec. 1951, p. 38-40.

Production of various parts of a food disposal unit. Choice of materials is dictated by service requirements and the method of fabricating by economy. They include iron powder impregnated with Cu, Ni bronze, and Zn.
(H general, E12, E13, T10, Fe, Cu, Zn)

9-H. For Wearing Qualities or Just Plain Cost Reduction, Appleton Depends Upon a Combination of PMM Processes. *Precision Metal Molding,* v. 9, Dec. 1951, p. 43-44, 75-77.

Die casting, powder-metal-part production, and plaster mold casting of bronze, Zn, Fe-Cu powder mixtures, and Al parts in the production of a spot light.
(H general, E13, E16, T10, Zn, Fe, Cu, Al)

10-H. Utilizing Impurities in Metal Powders. H. W. Greenwood. *Metal Industry,* v. 79, Nov. 30, 1951, p. 455-456.

Importance of minor percentages of elements on properties of the base metal. Further areas of research in this field. (H11)

11-H. Some Observations on the Role of the Binder in Cemented Refractory Alloys. J. T. Norton. *Powder Metallurgy Bulletin,* v. 6, Dec. 1951, p. 75-78.

Advantages and disadvantages of a solid homogeneous block of tungsten carbide as compared to tungsten carbide cemented with Co. Favors the heterogeneous combination, and lists criteria for a satisfactory binder material. (H12, W, Co, C-n)

12-H. Steel Parts by Hot Coining. J. P. Scanlan. *Powder Metallurgy Bulletin,* v. 6, Dec. 1951, p. 78-80.

Coining as a method of increasing the density of parts made from powdered steel alloys. Table gives mechanical properties and density of three hot-coined alloy steels.
(H14, P10, Q general, AY)

13-H. Infiltration Metallurgy. Claus G. Goetzel. *Research,* v. 4, Dec. 1951, p. 555-561.

Variations in techniques of production. Mechanical and physical properties of some powder combinations as well as applications. Data are graphed.
(H16, Q general, P general)

J

HEAT TREATMENT

23-J. Step Quenching, Hot Peening Improve Lean Alloys. R. F. Harvey. *Iron Age,* v. 168, Dec. 27, 1951, p. 70-71.

A modified step-quench treatment for toolsteels wherein higher intensities of peening may be used safely without danger of cracking.
(J26, G23, TS)

24-J. Basic Parts That Mean So Much. John A. Caswell. *Instrumentation,* v. 5, 4th qtr., 1951, p. 10-11.

Heat treating furnaces and controls used in production of critical aircraft components at Tube Turns, Inc., Louisville, Ky. (J general, S16)

25-J. The Relative Effects of Chromium and Silicon Contents on Rate of Anneal of Black-Heart Malleable Iron. Part I. First Stage Annealing. Part II. Second Stage Annealing. J. E. Rehder. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 244-251; disc., p. 251-252.

Previously abstracted from Preprint 51. See item 136-J, 1951.
(J23, N8, CI)

26-J. Malleable Cast Iron—Annealing Furnaces and Atmosphere. O. E. Cullen and R. J. Light. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 494-499; disc., p. 499-500.

Previously abstracted from Preprint 62. See item 137-J, 1951.
(J23, CI)

27-J. Some Jominy Tests on Fine Carbon Steel and Special Low-Alloy Steel. (In French.) *Circulaire d'Informations Techniques,* v. 8, Nov. 1951, p. 1283-1293.

Five types of steel were used. Tests were conducted on various special heats of steel. (J26, CN, AY)

28-J. Influence of Test Conditions on End-Quench Testing of Steels. (In German.) Walter Peter and Adolf Rose. *Archiv für das Eisenhüttenwesen,* v. 22, Sept.-Oct. 1951, p. 303-312.

Tests were done on six German low-alloy steels in order to determine the influence of variations of testing conditions on the results. 12 ref. (J26, AY)

29-J. How Flame and Induction Heating Work. John Obrebski. *American Machinist,* v. 96, Jan. 7, 1952, p. 122-125.

Clarified by schematic diagrams showing application to various steel parts. (J2, ST)

30-J. Keeping Gas Utilization in Step With Product and Progress. Jack Huebler. *Industrial Gas,* v. 30, Dec. 1951, p. 7-10, 22-23.

The integrated mechanical handling of steel to and from heat treating furnaces. Various installations for hardening, carburizing, heating of forging billets, annealing, carbon restoration. (J general, A5)

31-J. Batch Furnaces for Continuous Production Proved Themselves in World War II. George Brailsford. *Industrial Gas,* v. 30, Dec. 1951, p. 3-5, 24-25.

Battery of standard, batch-type, full-muffle, gas-fired furnaces which harden tank-tread links in quantities equivalent to a large continuous installation without major production losses due to down-time.
(J26, ST)

32-J. Induction Hardening of Coupling Bolts Improves Production. *Industrial Heating,* v. 18, Dec. 1951, p. 2186.

Use of a General Electric Induction heater at De Laval Steam Turbine Co., Trenton, N. J., has cut coupling-bolt hardening costs 70% and increased production. (J2, ST)

33-J. Heat Treating of Tools and Dies Featured at Patton Manufacturing Co. *Industrial Heating,* v. 18, Dec. 1951, p. 2194, 2196, 2198, 2200, 2202, 2204, 2206.

Heat treating furnaces and associated control equipment of Springfield, Ohio, plant. (J26)

34-J. Continuous Furnaces Economically Treat a Variety of Parts. Charles W. Heilman. *Materials & Methods,* v. 34, Dec. 1951, p. 87-88.

Practice at Commonwealth Industries, Detroit, whereby a pair of continuous, controlled-atmosphere, radiant-tube furnaces are used for hardening; case carburizing, dry cyaniding and carbonitriding on a jobbing basis. The speed of conveyors is varied to handle various size parts. (J26, J28)

35-J. High Production Heat Treatment of Steering Gear Parts. Geo. Goepfert. *Automotive Industries,* v. 106, Jan. 1, 1952, p. 50-52, 90, 92, 94.

Heat treatment procedures applied to steering cams made of SAE 8620 steel. (J general, AY)

36-J. Prepared Atmospheres—Their Generation and Application. Part I. C. George Segeler. *Industrial Heating,* v. 18, Oct. 1951, p. 1788, 1790, 1792, 1891-1892, 1896.

Generation and composition of prepared atmospheres used for various industrial operations, application of these atmospheres, and results obtained through their use in various metallurgical operations, including carburizing, cyaniding, annealing, brazing, hardening, and sintering. (To be continued.)
(J2, K8, H15)

37-J. Martempering; Invention and Early History. Richard F. Harvey. *Iron & Steel,* v. 25, Jan. 1952, p. 14-16.

Surveys literature. References.
(J26)

38-J. The Surface Hardening of Steel. Part XI. Flame Hardening. G. T. Colegate. *Metal Treatment and Drop Forging,* v. 18, Dec. 1951, p. 549-558.

The potentialities of flame hardening and its accompanying problems, including the design of gas jets, and design and position of the quenching jets. Various flame hardening techniques and influence of composition of the steel. Advantages and disadvantages of flame-hardening. (To be continued.) (J2, ST)

39-J. Flame Softening in Metal Fabricating Industries. William B. Sharav. *Steel Processing,* v. 37, Dec. 1951, p. 599-602, 613.

Three flame-softening methods. Costs, process results, and miscellaneous applications. (J2)

40-J. Hardenability Testing of Structural Alloy Steels. (In German.) Max

Kroneis and Helmut Krainer. *Stahl und Eisen*, v. 71, Dec. 6, 1951, p. 1365-1374; disc., p. 1375.

Application of two hardenability testing methods to steels containing 0.25-0.40% C, 0.3-1.25% Si, 0.6-1.8% Mn, 0-0.8% Al, 0-2.4% Cr, 0-0.2% Mo, and 0-0.2% V. Advantages and disadvantages of the two methods. Graphs and tables. (J26)

K

JOINING

61-K. New Frequency Converter Welders Developed for Aircraft Alloys. F. L. Brandt. *Iron Age*, v. 168, Dec. 27, 1951, p. 72-73.

Tentative standards set up by Resistance Welder Manufacturers' Association and National Electrical Manufacturers' Association for spotwelder frequency welders of two types, commercial and aircraft. Newtype welders have been developed for high-temperature, corrosion resistant alloys. (K3, SG-g, h)

62-K. Research Progress by the British Welding Research Association. H. E. Taylor and H. G. Taylor. *Sheet Metal Industries*, v. 28, Dec. 1951, p. 1121-1130, 1136.

Reviews research under way in the laboratories of the Sheet and Strip Metal Users' Technical Assn. Formulation of codes of practice for resistance welding processes is an important object of the work. 15 ref. (K9, K3, Ag)

63-K. A Review of the Theory and Practice of Inert-Gas Shielded-Arc Welding. W. J. Jackson. *Sheet Metal Industries*, v. 28, Dec. 1951, p. 1131-1136.

A survey. 14 ref. (K1)

64-K. Synthetic Resin Adhesives. F. Chapman. "Adhesion and Adhesives" (Elsevier Publishing Co., New York), 1951, p. 201-249.

Various phases of thermosetting and thermoplastic adhesives. Properties required for metal-to-metal, metal-to-wood, and wood-to-wood bonding. 98 ref. (K12)

65-K. Rubbery Adhesives. G. Salomon and W. J. K. Schönlau. "Adhesion and Adhesives" (Elsevier Publishing Co., New York), 1951, p. 386-426.

Adhesion of rubber to metals. Emphasis is placed on brass plating. 19 ref. (K11, Cu)

66-K. Adhesion in Soldered Joints. W. R. Lewis. "Adhesion and Adhesives" (Elsevier Publishing Co., New York), 1951, p. 427-462.

Methods of soldering, influence of surface condition, treatment of oxidized surfaces, structure of the bond, nature of compound layers, effect of rate of cooling, and strength of solders. Includes all solderable metals. 38 ref. (K7, EG-f)

67-K. Design for Redux. H. Giddings. *Aircraft Production*, v. 13, Dec. 1951, p. 387-392.

Basic characteristics of the Redux joint. Application of Redux to the basic types of structural element in aircraft, to the stiffened panel of various forms subject to compression, shear and bending types of loading. Redux specimens consisted of D.T.D. 610-type Al alloy. Diagrams and graphs. (K12)

68-K. Welding Band-Saw Blades. H. J. Chamberland. *American Foundryman*, v. 20, Dec. 1951, p. 53-54.

How to select and use welding equipment designed to produce band-saw welds that hold up under high or super high speeds. The portable flash welder is recommended. (K3, ST)

69-K. How to Tip Tools With Prehardened HSS. Leo J. St. Clair. *American Machinist*, v. 96, Jan. 7, 1952, p. 133-140.

How to braze prehardened high-speed-steel tips to ordinary steel tool shanks, for conservation of critical Co and W. The author grants free permission for use of patents held by him on the process. Numerous schematic diagrams. (K8, TS, CN)

70-K. Aluminum Cylinder Head Formed by New Methods. Frank Jardine. *Automotive Industries*, v. 195, Dec. 15, 1951, p. 34-35, 112.

How furnace brazing of individual permanent-molded sections permits economical production of light-alloy cylinder blocks and heads. (K8, T7, Al)

71-K. Metlbond Process for Joining Metal With Adhesives. G. G. Havens and E. P. Carmichael. *Automotive Industries*, v. 195, Dec. 15, 1951, p. 48-49, 102, 104, 106, 108.

How the utilization of organic materials in thin glue-line form gives joints equal or superior in strength to the materials joined. (K12)

72-K. Studies of Ceramic Fluxes for Welding Steel. II. Willi M. Conn. *Ceramic Age*, v. 58, Nov. 1951, p. 15-17.

Electric-arc welding by the submerged-arc process. Eleven principal requirements which must be met by a flux. Performance of fluxes prepared by different methods, including those consisting of a mechanical mixture of several ingredients, flux based on glass, and that based on mullite. (K1, ST)

73-K. Better Welding at Lower Cost. Lew Gilbert. *Industry & Welding*, v. 24, May 1951, p. 50, 52; Sept. 1951, p. 43-44, 76-77; Jan. 1951, p. 57-58, 80.

Various factors which determine quality and cost of welding. Hints for securing improved quality and lower costs. Selection of correct electrode types and proper electrode sizes. Data are tabulated. (K1)

74-K. Metal Stitching Speeds Aluminum Door Assembly. Harry Smith. *Light Metal Age*, v. 9, Dec. 1951, p. 18.

The process and its advantages over welding or riveting. (K13, Al)

75-K. Improved Welding Techniques Join Stainless to Mild Steel. *Industry & Welding*, v. 25, Jan. 1952, p. 50-52, 55.

Heavy pipe-to-pipe welding is being mechanized by use of a standard submerged-arc head. (K1, SS, CN)

76-K. High Speed Silver Brazing. *Industry & Welding*, v. 24, Jan. 1951, p. 65.

A 45% silver alloy, containing Cu, Cd, and Zn is preformed of 0.047-in. wire to 1⅜-in. o.d. rings. Set in place on flanged and flared parts of 4130 steel, $\frac{1}{32}$-$\frac{3}{64}$ in. thick, the entire assembly is quickly brushed with a water-soluble flux and set on a moving endless belt. (K8, Ag, Cu, Cd, Zn, AY)

77-K. Major Advancements in Welding Design, Materials, and Methods. Howard Cary. *Industry & Welding*, v. 25, Jan. 1952, p. 31-32, 34, 72-73.

Techniques developed at Marion Power Shovel Co. (K general)

78-K. High Hardenability Steels Flash-Welded Automatically. Jon Ruhlman and B. E. Nye. *Iron Age*, v. 168, Dec. 20, 1951, p. 95-99.

The flash-butt welding process in use in the fabrication of aircraft landing gears from high-strength alloy steels. (K3, AY)

79-K. Current Welding Research Problems. *Journal of the American Society of Naval Engineers*, v. 63, Nov. 1951, p. 991-1005.

Previously abstracted from *Welding Journal*. See item 393-K, 1951. (K9)

80-K. Metals and Nonmetals Joined Efficiently by Stitching. Arthur G. Denne. *Materials & Methods*, v. 34, Dec. 1951, p. 76-79.

Capabilities, limitations, and applications of the process. Includes wood, metals, and plastics. (K13)

81-K. Welding Magnesium Alloys. R. L. Nelson and I. C. Mattson. *Metal Industry*, v. 79, Dec. 7, 1951, p. 475-477; Dec. 14, 1951, p. 495-498.

Previously abstracted from *Welding Engineer*. See item 641-K, 1951. (K general, Mg)

82-K. Coating Moisture and Welding Cracking. *Metal Progress*, v. 60, Dec. 1951, p. 152, 154, 156. (Condensed from "Nickel-Molybdenum-Vanadium Alloy Steel Shielded-Arc Welding Electrodes [Low Hydrogen Type]," E. H. Franks, C. T. Gayley, and W. H. Wooding.)

Previously abstracted from *Journal of the American Society of Naval Engineers*. See item 516-K, 1950. (K1, T5, CN, AY)

83-K. The Bonding of Friction Fabric. G. S. Learmonth. *Plastics*, Dec. 1951, p. 340-341.

Factors which affect the bonding of friction fabrics to their metallic supports are temperature, solvents remaining on the adhesive film before bonding, pressure during bonding, and baking-time temperature. (K11)

84-K. Forum on Technical Progress: Fastening & Assembling. *Steel*, v. 130, Jan. 7, 1952, p. 379-380, 382, 384-386, 389-390, 393, 396, 398.

Brief discussions by men from industry on the present situation and anticipations for 1952. (K general)

85-K. Probabilities of Interference Between Resistance Welders. W. K. Boice. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 775-783.

Calculated data concerning the probabilities that the voltage during a resistance weld will be inadequate because of voltage drops due to other welders. This information is useful for design or power systems for supplying groups of welders. Graphs. 10 ref. (K3)

86-K. Welding Calculations—Effect of Conductor Configuration in Overhead Lines. H. Watson Tietze. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 784-786.

Results of an investigation show that proper evaluation of the magnitude of the voltage dip in single-phase welding problems requires recognition of the changes in reactance of conductors, disposed on a horizontal crossarm, due to interaction of the phase currents. (K3)

87-K. A-C Arc Welders With Saturable Reactor Control. S. Oestreicher. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 787-790.

Characteristics of the equipment. Illustrations, graphs and diagrams. (K1)

88-K. The Physical Mechanism of Low- and High-Current Arcs, and Their Relation to the Welding Arc. Wolfgang Kinkelnburg. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 800-803. (K1)

89-K. Production of the All-Welded Bicycle. *Welding and Metal Fabrication*, v. 19, Dec. 1951, p. 450-456.

Sequence of operations and the techniques involved. (K general, T10)

90-K. The World's Largest Walking Dragline. *Welding and Metal Fabrication*, v. 19, Dec. 1951, p. 466-473.

Design and construction of an all-welded 282-ft. jib. Material is high-tensile steel. (K1, T26, CN)

91-K. Submerged-Arc Welding in Tandem. E. A. Clapp. *Welding Engineer*, v. 37, Jan. 1952, p. 43-47.

A new method which uses 3-phase

power in submerged-arc welding. Welding speeds are two to three times faster than can be obtained with a single-rod technique. The effects of phase angle, phase sequence, power distribution between rods, and of primary power factor were investigated. Most of these factors were found to have considerable influence on the quality of the welds produced. (K1)

92-K. "Permanent" Pipe Lines for Liquid Food Products. H. L. Bindeman and L. N. Hoopes. *Welding Engineer,* v. 37, Jan. 1952, p. 48-50.

Advantages of using permanent welded pipe for conveying liquid food products. Gas or arc welding may be used. Planning the line, preparing and welding pipe, grinding, polishing, cleaning, and sterilizing. (K1, K2, T29, SS)

93-K. Ways to Fabricate Monel Tanks for Boats. H. B. Bott. *Welding Engineer,* v. 37, Jan. 1952, p. 33-35.

Welding processes for attaching tank heads, installing baffles, and adding pipe fittings. (K general, Ni)

94-K. How Ryan Makes "Sky-Beams". *Welding Engineer,* v. 37, Jan. 1952, p. 36-37.

Spot welding of Al beams for strato-freighters at Ryan Aeronautical Co. Forming and heat treatment of the floor beams. (K3, G general, J general, Al)

95-K. Big Welded Relief Valve Goes Into Hoover Dam. T. B. Jefferson. *Welding Engineer,* v. 37, Jan. 1952, p. 38-39, 47.

Describes welding procedure for the above. (K1, T26, ST)

96-K. New Welded Addition to Seattle Store. Ray Bloomberg. *Welding Engineer,* v. 37, Jan. 1952, p. 40-42.

Construction of the building. Compares advantages of welded steel and reinforced concrete. (K1, T26, ST)

97-K. Corrosion-Free Stainless Welds. G. E. Linnert. *Welding Engineer,* v. 37, Jan. 1952, p. 51-53.

Properties of welded joints in extra-low-carbon stainless steels, particularly resistance to intergranular corrosion. Practically all welding methods can be used. Use of these steels eliminates postweld annealing, simplifies field repair, reduces metal costs and conserves columbium. (K general, R2, Q general, SS)

98-K. Arc Welding Redesign Is Evolution Not Revolution. R. P. Lindgren. *Welding Engineer,* v. 37, Jan. 1952, p. 58-59.

The changeover from a casting to a welded design. Compares the two procedures. Table gives mechanical properties of cast iron and mild steel. (K1, Q general, CI, CN)

99-K. Spot and Projection Welding Using Magnetic Electrode Force. Wm. E. Klingeman and Harold H. Kruer. *Welding Journal,* v. 30, Dec. 1951, p. 1073-1078.

New welding process has made it possible to weld previously difficult and critical applications with a new degree of uniformity. It is mainly being used for the welding of pure silver, coined silver and tungsten electrical contacts, although advantages have also been found for many other applications involving brass, copper, and stainless steel. Diagrams and illustrations. (K3, Ag, W, Cu, SS)

100-K. The Effect of Power-Supply Characteristics on D. C. Welding. Jack B. Keyte. *Welding Journal,* v. 30, Dec. 1951, p. 1079-1083.

A study of the influence of variations in the slope of the volt-ampere characteristics curve and the machine time constant of a d. c. welding machine on spatter loss, deposition rate, and penetration. Data are diagrammed and graphed. (K1)

101-K. Sigma Welding of Carbon Steels. H. T. Herbst and T. McElrath, Jr. *Welding Journal,* v. 30, Dec. 1951, p. 1084-1091.

Experimentation resulting in the successful welding of carbon steels by the shielded inert-gas metal-arc process achieved by the addition of small amounts of O_2 to the argon gas. Data are tabulated and graphed. (K1, CN)

102-K. Dilution and Diffusion Aspects of Nonfusion Welding. R. D. Wasserman and J. Quaas. *Welding Journal,* v. 30, Dec. 1951, p. 1098-1101.

The science of physicochemical phenomena and thermodynamic data is applied to a better understanding of the brazing processes. Data are diagrammed and tabulated for a wide variety of ferrous and nonferrous alloys. (K8)

103-K. The Welding and Brazing of Copper Alloys. J. Imperati and Ira T. Hook. *Welding Journal,* v. 30, Dec. 1951, p. 1102-1107.

A survey of the more important Cu and Cu alloys, and the welding processes and techniques commonly used. Data are tabulated. (K general, Cu)

104-K. Temperature Distribution During the Flash Welding of Steel. E. F. Nippes, W. F. Savage, J. J. McCarthy, and S. S. Smith. *Welding Journal,* v. 30, Dec. 1951, p. 585s-601s.

Flashing methods are compared on the basis of temperature distribution. How this information may be utilized in selecting flashing variables. Data are graphed and tabulated for welding of SAE 1020 steel. (K3, CN)

105-K. Improvement of Inert-Gas Welding by Using High-Purity Helium. William A. Mays. *Welding Journal,* v. 30, Dec. 1951, p. 602s-606s.

Helium-shielded arc welding process which produces sound, nonporous welds on Al, Mg stainless steel, and many other hard-to-weld metals. Effects of various impurities on the welding of Al, also precautions necessary in handling high-purity He to avoid contamination. (K1, Al, Mg, SS)

106-K. Relation of Notch Strain to Deflection in the Notch-Bend Test. E. M. Emery and A. E. Flanigan. *Welding Journal,* v. 30, Dec. 1951, p. 607s-612s.

An experimental investigation of the strains developed at the base of the notch in a longitudinal notch-bend specimen used for the evaluation of weld ductility. Material was ASTM A285-C steel plate. (K9, CN)

107-K. Microcracks and the Low-Temperature Cooling Rate Embrittlement of Welds. A. E. Flanigan and M. Kaufman. *Welding Journal,* v. 30, Dec. 1951, p. 613s-622s.

Results of tensile, fatigue, and impact tests on mild steel welds. Certain features of the microcracks which are associated with embrittlement produced by too rapid cooling following welding. Diagrams and microphotographs. (K9, Q23, CN)

108-K. The Metallurgical Principles of Stage Welding. Tore Noren. *Machinery Lloyd* (Overseas Ed.), v. 23, Dec. 8, 1951, p. 106-107, 109, 111-114.

New arc welding method applicable to toolsteels base on isothermal transformation principles. It is useful in the repair of high speed steel tools and tools of similar alloys. (K1, TS)

109-K. Welding of Aluminum Alloys by the MATI Method. (In Russian). G. D. Nikiforov. *Avtogennoe Delo,* v. 22, Mar. 1951, p. 1-4.

Equipment and techniques. Recommendations are made for oxy-acetylene welding of various thicknesses of four alloys. (K2, Al)

110-K. Power Sources for Argon-Arc Welding of Aluminum Alloys With Tungsten Electrodes. (In Russian.) L. A. Mordvintsev and E. A. Guseva. *Avtogennoe Delo,* v. 22, Mar. 1951, p. 4-7.

Oscillographic studies were made of the welding currents from different power sources and various auxiliary equipment. Influence of these variables on the welds. (K1, Al)

111-K. The Question of Intercrystalline Corrosion of 18-8 Type Steel During Single-Pass Butt Welding. (In Russian.) A. G. Mazel. *Avtogennoe Delo,* v. 22, Mar. 1951, p. 7-9.

The influence of temperature and duration of heating for various types of welding on corrosion of 18-8 was investigated. Data are tabulated. (K1, R2, SS)

112-K. Test of Metals for Sensitivity to Thermal Cycles of Welding. (In Russian.) E. M. Kuzmak. *Avtogennoe Delo,* v. 22, Mar. 1951, p. 9-11.

Influence of different types of heating and various thermal cycles encountered in arc welding on structural changes of certain steels. Results are charted. (K1, ST)

113-K. Preparation of Ferromanganese for Electrode Coatings. (In Russian.) N. N. Kriukovskii. *Avtogennoe Delo,* v. 22, Mar. 1951, p. 15-17.

The influence of the fineness of ferromanganese powder on the composition of the deposited metal in welding steel was investigated. Data are discussed and tabulated. (K1, T5, CN, Fe-n)

114-K. Single-Pass, Submerged-Melt Welding of Boiler Steel 10-20 Mm. Thick. (In Russian.) S. E. Sinadskii. *Avtogennoe Delo,* v. 22, Mar. 1951, p. 17-21.

Equipment and techniques of applying flux materials during submerged-melt welding. Influence of various fluxes and welding conditions. Results are charted. (K1, CN)

115-K. Ways of Reducing Porosity of Weld Seams During Automatic Welding of Structural Sections. (In Russian.) A. S. Fal'kevich and V. S. Volodin. *Avtogennoe Delo,* v. 22, Mar. 1951, p. 21-23.

Results of X-ray investigations on steel welds made with fluxes containing different amounts of moisture. (K1, CN)

116-K. Rational Methods of Welding Concrete-Reinforcements for Hydroelectric Structures. (In Russian.) N. L. Kaganov. *Avtogennoe Delo,* v. 22, Apr. 1951, p. 1-4.

Techniques and apparatus for arc and gas welding of concrete reinforcing rods. (K1, K2, CN)

117-K. Mechanization and Automatization of the Processes of Welding Fittings and Networks for Reinforced Concrete. (In Russian.) N. E. Nosenko and V. A. Gorokhov. *Avtogennoe Delo,* v. 22, Apr. 1951, p. 4-7.

Machines for electric welding of reinforcing materials. (K1, CN)

118-K. Investigation of the Equilibrium State of the Metal-Slag System During Welding with TsI-1 Electrodes. (In Russian.) V. A. Lapidus. *Avtogennoe Delo,* v. 22, Apr. 1951, p. 12-15.

Equilibrium conditions in the molten deposit during arc welding of steels with above rods are calculated. Results are tabulated. (K1, ST)

119-K. Equipment of TsNIITMASH [Central Scientific-Research Institute of the Heavy Machine Industry] for Automatic Welding With Three-Phase Current. (In Russian.) I. L. Brinberg. *Avtogennoe Delo,* v. 22, Apr. 1951, p. 15-20.

Equipment is described, diagrammed, and illustrated. Includes circuit diagrams. (K1)

120-K. Is Columbium Necessary in Welding Wire? (In Russian.) I. Z. Kagan. *Avtogennoe Delo,* v. 22, Apr. 1951, p.26-27.

Intergranular corrosion of welded 18-8 steel and the use of Cb in welding of wire. (K1, T5, SS)

121-K. The Use of Salt Baths for Soldering of Metals. (In Russian.) L. E. Fedotov. *Stanki i Instrument,* v. 22, Mar. 1951, p. 33-34.

Briefly described. (K7)

122-K. The Weldability and Mechanical Properties of a Series of Low-Alloy Steels. J. G. Ball and C. L. M. Cottrell. *Journal of the Iron and Steel Institute,* v. 169, Dec. 1951, p. 321-336.

Diagrams indicating the effect of steel composition on weldability were constructed, and compared with others indicating the mechanical strength of the steels in both the normalized and tempered conditions; these comparisons lead to a range of compositions giving the best combination of weldability and mechanical strength. The microstructure of the steels in the normalized condition is related to their weldability, and the effect of tempering temperature after normalizing on the mechanical properties and microstructure of one of the steels was investigated; evidence to support a significant relationship observed has been obtained from a number of the other steels of the series. Table summarizes results. 10 ref. (K9, Q23, AY)

123-K. Spotwelding Structural Aluminum Floor Beams. Gilbert C. Close. *Modern Machine Shop,* v. 24, Jan. 1952, p. 128-130, 132, 134, 136.

Fabrication method results in weight saving. Forming, heat treating, and finishing operations. (K3, T26, Al)

124-K. Stainless Brazed Without Fluxing. F. W. Beall. *Steel,* v. 130, Jan. 14, 1952, p. 57.

Difficulties of furnace brazing stainless steel parts are largely overcome by first plating the parts with a thin coating of iron. (K8, L17, SS)

125-K. A Comparison of Heating Methods for Brazing. Part I. Lester F. Spencer. *Steel Processing,* v. 37, Dec. 1951, p. 617-623.

Advantages of brazed joints which make brazing an ideal method for the joining of metals. Factors to be considered in the brazing methods. (To be continued.) (K8)

126-K. Welding and Soldering Aluminum. (In French and German.) E. Zurbrügg. *Zeitschrift für Schweisstechnik; Journal de la Soudure,* v. 41, Sept. 1951, p. 161-165; Oct. 1951, p. 183-191.

Various methods and conditions for welding Al and its alloys. Graphs show strength data of welded and annealed Al alloys and diagrams illustrate different weld designs. Concluding part emphasizes particularly the advantages of welding under inert gas without flux and characterizes brazing and soldering of Al. (K general, Al)

127-K. Welding of "Aluman" Roofing. (In French and German.) E. Müller. *Zeitschrift für Schweisstechnik; Journal de la Soudure,* v. 41, Dec. 1951, p. 217-222.

Welding of various "Aluman" (Al-Mn alloy) roofing and gutter types. Photographs. (K general, T26, Al)

128-K. (Book) **Resistance Welding Data Book.** Ed. 4. 500 pages. 1952. P. R. Mallory & Co., Inc, Indianapolis, Ind. $3.00.

Separate chapters cover resistance-welding fundamentals, spot, projection, seam, flash, upset, butt, and butt-seam welding, metals to be welded, alloys to be welded, electrodes, die holders, recommended practices, standard testing methods and resistance welds. Numerous photographs, charts, tables, and diagrams. (K3)

129-K. (Book) **The Welding Encyclopedia.** Ed. 13. T. B. Jefferson. 1008 pages. 1951. McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. $7.50.

Treats every subject which deals in any way with welding, cutting, or related processes. (K general)

L

CLEANING, COATING AND FINISHING

75-L. Producing Low-Cost Molds for Aircraft Parts by Metallizing. G. B. Lewis and L. Frost. *Machinery* (American), v. 58, Dec. 1951, p. 152-156.

Procedures employed. Hydrocal, phenolic, ceramic, aluminum, and Kirksite molds were metallized and were shown to give satisfactory results in forming low-pressure laminated plastics. (L23, T5)

76-L. Keeping Stainless Steel Clean. *Machinery* (American), v. 58, Dec. 1951, p. 252.

Methods of cleaning stainless steels in order to insure longer life. (L12, SS)

77-L. Conservation in Enameling Operations. Evan M. Oliver. *Ceramic Age,* v. 58, Dec. 1951, p. 28-30.

Previously abstracted from *Better Enameling.* See item 739-L, 1951. (L27)

78-L. Application of Dilatometric Analysis to the Enameling of Cast Iron. (In French.) Auguste Le Thomas and Pierre Tyvaert. *Fonderie,* Nov. 1951, p. 2685-2691.

Results of a comparative study of the expansibility of cast iron and enamel, explaining dilatometric measurements and some examples of their application. (L26, P12, CI)

79-L. Painting by Flotation Method. L. B. Donovan. *American Paint Journal,* v. 36, Dec. 24, 1951, p. 64-68.

New method for water-sealed gas holders. The paint is floated on the water seal. As a lift descends through the film of paint and into the water, positive hydraulic pressure forces the paint into the lift surface and distributes it uniformly. As the lift rises, surplus paint flows off, to float again on the water seal where it can be pumped off for reuse. The resulting coating was shown to be more effective in preventing corrosion than those applied by conventional methods. (L26, ST)

80-L. Cleaning of Steel Test Panels for Paint. Thomas Rice. *ASTM Bulletin,* Dec. 1951, p. 50-58.

Two basic cleaning methods for removal of oil and smut were adopted, namely, solvent spray cleaning and trichlorethylene vapor degreasing; also two modifications of these in which a phosphoric acid dip is used. A standard method for packaging panels has been adopted. Methods for testing cleaned panels for cleanliness and surface activity. Tables and test-panel photographs. (L12, ST)

81-L. Ti-Loc One Coat White Titanium Direct to Non-Premium Steel. Paul S. Cecil. *Better Enameling,* v. 22, Dec. 1951, p. 8-12.

See abstract from *Finish,* item 779-L, 1951. (L27, ST)

82-L. Methods for Testing for Enamel Coating Discontinuities. Stanley C. Orr. *Better Enameling,* v. 22, Dec. 1951, p.16-19, 31.

A compilation of procedures and equipment in common use. In general, these tests are based upon the fact that a continuous enamel layer possesses excellent electrical insulating properties. (L27, S13)

83-L. Surface Protection Via Phosphate Coatings. Melvin G. Crandell. *Canadian Chemical Processing,* v. 35, Dec. 1951, p. 994-996, 998-999.

"Bonderite"—a chemical compound that produces a phosphate coating on steel, Fe, Zn, Cd, and Al and their alloys—is also used as an aid in the deep drawing of metals. Applications in corrosion prevention. (L14, G21)

84-L. Alternatives to Nickel-Chrominum Plating; Some British Views. *Electroplating and Metal Finishing,* v. 4, Dec. 1951, p. 379-380.

Some of the salient points which emerged from the Practical Platers' One-Day Conference, held by the Institute of Metal Finishing in Birmingham on Nov. 6, 1951. (L17, Ni, Cr)

85-L. The Protection of Steel by Sprayed Aluminium. W. E. Ballard. *Electroplating and Metal Finishing,* v. 4, Dec. 1951, p. 395-399.

A mechanism is postulated for the formation of the rust stains which sometimes appear on Al-sprayed steel. Methods for avoiding the staining are suggested. (L23, ST, Al)

86-L. Flow Coating at Maytag. Max Schmiedeke, Jr. **Flow Coating Conventional Washer Parts at Maytag.** Matt Heuertz. *Finish,* v. 9, Jan. 1952, p. 31-32.

Procedures and equipment in washing-machine production. (L26, CN)

87-L. Infrared Heaters Improve Drying of Ferguson Tractor Parts. *Industrial Heating,* v. 18, Dec. 1951, p. 2243-2244, 2253. (L26)

88-L. Recent Ceramic Coatings for High-Temperature Alloys. *Industrial Heating,* v. 18, Dec. 1951, p. 2263-2264, 2266, 2268, 2320, 2322.

See abstract of "The Growing Role of Protective Coatings for Metals in High Temperature Service", W. N. Harrison, *American Society for Testing Materials,* "Symposium on Corrosion of Materials at Elevated Temperatures," item 628-L, 1951. (L27, SG-h, ST)

89-L. Photos on Aluminum Resist Heat and Scratching. Eugene Wainer. *Iron Age,* v. 168, Dec. 20, 1951, p. 104-105.

Pictures, nameplates, and drawings reproduced photographically on aluminum have a hard, scratch-resistant, glass-like surface. The image is substantially grainless and halftones may be faithfully reproduced. The method uses photographic and anodic processes. Use of dyes gives many rich color effects. (L14, T9, Al)

90-L. Sherardizing; Modern Developments and Applications. A. E. Williams. *Iron and Steel,* v. 25, Dec. 1951, p. 529-533.

The nature of the coating obtained and the essential ingredients of the mixture used. Typical applications. (L16, T general, ST, Zn)

91-L. Protective Coatings Used on Gas Pipe. Roy T. Richards and N. K. Senatoroff. *Journal, American Water Works Association,* v. 43, Dec. 1951, p. 1015-1016.

Various methods used by the central Arizona Light and Power Co. in the protection of its cast iron pipes. (L general, CI)

92-L. Vitreous Enamel Finishes for Aluminium; A Review of Recent Investigations. J. C. Bailey. *Light Metals,* v. 14, Dec. 1951, p. 647-656.

The properties required in an enamel finish on Al. Data on the influence of alloy composition and pretreatment on appearance and adhesion of lead-free enamel are tabulated. Results of performance tests on some enamels. (L27, Al)

93-L. Electrodeposited Tin Alloy Coatings Are Promising Alternates for Tin Plate. Kenneth Rose. *Materials & Methods,* v. 34, Dec. 1951, p. 70-72.

Process and applications for Sn-Cu, Sn-Zn, and Sn-Ni plating. (L17, Sn, Cu, Zn, Ni)

94-L. Alternatives to Nickel-Chromium Plating. Answers to Queries in "Bright Zinc" Discussion. *Metal Industry,* v. 79, Dec. 14, 1951, p. 503-504.

Discussion on a paper "Bright Zinc Plating" by N. A. Tope. (L17, Zn, Ni, Cr, ST)

95-L. Nickel Plated Slides. H. H. Symonds. *Metal Industry,* v. 79, Dec. 14, 1951, p. 504-505.

Investigation on a defective finish encountered on a number of Ni-plated, case hardened slides. Micrographs. (L17, Ni)

96-J. Flame Hardening and Tempering of Steel. *Metal Progress,* v. 60, Dec. 1951, p. 120, 122, 124. (Translated and condensed from paper by Hans Bühler and Hans Wilhelm Grönegress.)

Previously abstracted from *Stahl und Eisen.* See item 142-J, 1951. (J2, J29, ST)

97-L. What Platers Can Do About the Nickel Shortage. *Metal Treating,* v. 2, Nov.-Dec. 1951, p. 8-9, 16. (Reprinted from *Steel.*)

Plating and coating techniques available where restrictions on Ni for plating make conventional Cu-Ni-Cr finishes impossible. (L17)

98-L. Ceramic Coatings for Prevention of Carbon Adsorption in Four Heat Resistant Alloys. Joseph W. Pitts and Dwight G. Moore. *National Advisory Committee for Aeronautics,* Technical Note 2572, Dec. 1951, 14 pages.

Three ceramic coatings were applied to Inconel and three 18-8 type stainless steels and then tested for their effectiveness in preventing carbon absorption under strongly carburizing conditions, that is, box carburizing. At 1350° F. no carbon pickup occurred after the 4-hr. treatment but, at 1500° and 1650° F., carbide precipitation was evident in the uncoated stabilized 18-8 steels extending down from the surface to a depth as great as 0.007 in. In most cases the ceramic coatings completely prevented the adsorption. Tables, graphs, and photomicrographs. 11 ref. (L27, J28, Ni, SS)

99-L. Substitutes for Nickel in Electroplating. J. J. Dale. *Plating Notes,* v. 3, Oct. 1951, p. 163-173.

Factors influencing choice of the metal to be deposited, corrosion characteristics of various metals, and other factors involved in making the choice. 13 ref. (L17, R5, Ni)

100-L. Finishing Precision Aircraft Accessories. Gilbert C. Close. *Products Finishing,* v. 16, Dec. 1951, p. 14-18, 20.

Finishing operations on a small Al air-expansion turbine. Cleaning, surface treating, and painting operations are described. (L12, L26, Al)

101-L. Quick Clear Dip Cuts Cost of Finishing Zinc Die Castings and Plated Parts. Arthur P. Schulze. *Products Finishing,* v. 16, Dec. 1951, p. 24-28, 30, 32.

Process is called "Unichrome Clear Dip". Advantages are its greater corrosion resistance and improved adhesion of organic coating on Zn. (L14, Zn)

102-L. Recent Developments in Ceramic Coatings for Steel. Allen G. Gray. *Products Finishing,* v. 16, Dec. 1951, p. 44, 46, 48, 50, 54, 56, 58, 60, 62, 66, 68, 70, 74.

As reported by various investigators. Some theories for adherence of porcelain enamels to steel. Results of adherence and abrasion tests. Data are tabulated. (L27, ST)

103-L. Forum on Technical Progress: Cleaning & Finishing. *Steel,* v. 130, p. 401-402, 404, 407-408, 410, 412, 415, 418, 420, 423-424.

Brief discussions by men from industry on the present situation and anticipations for 1952. (L general)

104-L. Electrolytic-Slide-Polishing. (In English.) Kenzo Nagai and Kunio Mano. *Science Reports of the Research Institutes, Tohoku University,* ser. B, v. 1-2, Mar. 1951, p. 391-398.

Electropolishing is recognized as a convenient method for polishing metals. So-called "electrolytic-slide polishing", sometimes proves to be better and more convenient. In the process acid electrolyte is used on some metals (Cu, Al, Zn, Ni, Fe, Mo, and their alloys), cyanide on precious metals (Ag, Au, Pt), and basic electrolytes on Al, Zn, and W. Explains the mechanism of metal polishing by this method and compares experimental results with those of conventional electropolishing. (L13)

105-L. Stresses in Enameled Cast Iron. (In German.) Alfred Thürmer. *Berichte der Deutschen Keramischen Gesellschaft e.V. und des Vereins Deutscher Emailfachleute e.V.,* v. 28, Sept. 1951, p. 504-511.

Methods of computing thermal expansion of enamels. Satisfactory enameling requires consideration not only of composition and treatment of enamel, but also of shape and condition of the casting. Data are tabulated. (L27, CI)

106-L. Latest Developments in Cyanide Zinc Baths. (In German.) Heinz W. Dettner. *Metalloberfläche,* ser. B, v. 3, Oct. 1951, p. B145-B148.

A review on the basis of the literature, with particular regard to new American processes. 36 ref. (L17, Zn)

107-L. Metal Plating on Plastics. *Automotive Industries,* v. 106, Jan. 1, 1952, p. 49.

How phenolic, styrene, and vinyl plastics may be plated with a hard film of Cu, Ag, Cr, or other metal by employing recently developed mass-production techniques. (L17, Cu, Ag, Cr)

108-L. After-Deposits Resulting from Chemical Cleaning Process. P. H. Cardwell. *Combustion,* v. 23, Dec. 1951, p. 67-68.

Amount and type of deposits. Causes for corrosion on the internal metal surface of the boiler. (L12, R5)

109-L. The Protection of Metallic Surfaces by Chromium Diffusion. Part V. Properties of Chromised Steel. R. L. Samuel and N. A. Lockington. *Metal Treatment and Drop Forging* v. 18, Dec. 1951, p. 543-548, 556.

Hardness, ductility and other mechanical properties; weldability, and original data on the resistance to corrosion and oxidation in various media. (To be continued.) (L15, Q general, R general, ST, Cr)

110-L. The Electrodeposition of Molybdenum and Its Alloys. F. W. Salt. *Murex Limited Review,* v. 1, No. 9, 1951, p. 201-210.

The history of Mo deposition; recent work. (L18, C23, Mo)

111-L. Graining of Lithographic Plates. Frank E. England. *National Lithographer,* v. 58, Dec. 1951, p. 28-29.

The essential components for graining Zn or Al plates. Abrasives that can be used. The graining and regraining procedures. (L10, Zn, Al)

112-L. Factors Affecting the Testing of Automotive Finishes. Ralph J. Wirshing and Werdley D. McMaster. *Organic Finishing,* v. 12, Dec. 1951, p. 8-11.

See abstract from *Paint, Oil, & Chemical Review,* item 510-L, 1951. (L12, L14, L26, CN, Cr)

113-L. Chromic Acid Anodizing Equipment and Its Practical Use. Herberth E. Head. *Plating,* v. 39, Jan. 1952, p. 40-41, 50.

Factors to be considered which promote greater efficiency as well as provide safe working conditions for the workers. (L19, A7, Al)

114-L. Electroplating of Gold Alloys. (Concluded.) Edward A. Parker. *Plating,* v. 39, Jan. 1952, p. 43-46, 50.

Includes data on green gold, white gold, antique gold, rose and green-gold smut. After-treatment is briefly discussed. 42 ref. (L17, Au)

115-L. Making Finishing Compositions. L. R. Eastman. *Plating,* v. 39, Jan. 1952, p. 47-49.

Various steps in formulating abrasive compositions used for polishing and buffing. (L10)

116-L. Cleaning and Preparation of Metals for Electroplating. IV. Degreasing Evaluation Tests: Sequential Testing. Henry B. Linford and Edw. B. Saubestre. *Plating,* v. 39, Jan. 1952, p. 55-63.

Statistical analysis of results. Data are tabulated. (L12, L17)

117-L. Review of Current Literature: Diaphragm Tanks. T. A. Hood. *Plating Notes,* v. 3, Oct. 1951, p. 178-183.

Includes diagrams. (L17)

118-L. Surface Finish. R. E. Reason. *Australasian Engineer,* Nov. 7, 1951, p. 59-61.

Author's reply to discussion on paper published in Oct. 8, 1951 issue. See item 60-L, 1952. (L15)

119-L. Notes on the Metallizing of Plastics. D. McPherson. *Metallurgia,* v. 44, Dec. 1951, p. 290, 310.

An outline of processes in use for metallizing plastics. Progress toward alloying plastic and metal without noticeable interfacial weakness. (L23)

120-L. Weld Deposition of Stellite on Bearing Surfaces of Shafts. (In French and German.) Paul Hartmann. *Zeitschrift für Schweisstechnik; Journal de la Soudure,* v. 41, Nov. 1951, p. 211-213.

Details of methods. (L24, Co, SG-m)

121-L. (Book) Chemical and Physical Determinations for Porcelain Enamel Plants. Michael Bozsin. 76 pages. Ferro Enamel Corp., 4150 E. 56th St., Cleveland.

Information the ceramic engineer needs to study chemical and physical conditions of a porcelain-enameling furnace and their effects on finished ware. (L27)

122-L. (Book) Metallizing Handbook. 1951. 250 pages. Metallizing Engineering Co., Inc., 3814 30th St., Long Island City, N. Y. $3.00.

Various methods of surface preparation and the application of metallized coatings for machine-element work, for corrosion protection, and for special production jobs. Applications include repair of blowholes in castings, mass coatings in tumbling barrels, model work, glass, and ceramics. Numerous photos, diagrams and charts. (L23)

M

METALLOGRAPHY, CONSTITUTION AND PRIMARY STRUCTURES

29-M. The Electron Microscope and Its Industrial Applications. J. W. Sharpe. *Chemistry & Industry,* Nov. 17, 1951, p. 976-981.

Uses in metallurgical studies, chemical research, industrial dust studies, rubber manufacture, and pigment and paint studies. 12 ref. (M21)

30-M. The Preparation and the Crystal Structures of Cobalt Nitride, Co_2N, of Cobalt Carbonitrides, $Co_2(C, N)$ and of Cobalt Carbide, Co_2C. J. Clarke and K. H. Jack. *Chemistry & Industry,* Nov. 17, 1951, p. 1004-1005.

10 references. (M26, Co)

31-M. The Uranium-Carbon System. M. W. Mallett, A. F. Gerds, and H. R. Nelson. *U. S. Atomic Energy Commission.* AECD-3226, Apr. 1, 1951, 32 pages.

Results of investigation. Gives the constitution diagram on the basis of melting point, X-ray, and metallographic data. (M24, V, C)

32-M. Structure and Mechanical Properties of a Mo-Ni-Cr Cast Iron. Edward A. Loria. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 353-357; disc., p. 357-359.

Previously abstracted from Preprint 8. See item 117-M, 1951. (M27, Q general, CI)

33-M. Effects of Certain Elements on Grain Size of Cast Copper-Base Alloys. R. A. Colton and M. Margolis. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 360-368; disc., p. 368-371.

Results of experiments to determine the effect of Ni on the grain size of Cu + 5% Pb, Cu + 5% Sn, Cu + 5% Zn and high-purity 85-5-5-5 alloy. (M27, Cu)

34-M. X-Ray and Electron-Diffraction Studies of Lubricating Surfaces. R. Brill. *Annals of the New York Academy of Sciences,* v. 53, art. 4, June 27, 1951, p. 824-835.

Reviews investigations on the structure of surface films for the case of boundary lubrication. Effect of stabilizing agents; structure of polished metal surfaces. 29 ref. (M27, M22)

35-M. What Is a Metal? Robert Maddin. *Chemistry,* v. 25, Dec. 1951, p. 18-25. (Reprinted from *Johns Hopkins Magazine.*)

Starts with growth of the metallic crystal, and gives results of physical and mechanical tests run on these single crystals. Illustrated. (M26)

36-M. Spheroidal Cast Irons. Albert M. Portevin. *Metal Progress,* v. 60, Dec. 1951, p. 82.

Metallographic structure. (M27, CI)

37-M. Chemical Brightening of Aluminium and Light Alloys. J. Hérenguel. *Metal Treatment and Drop Forging,* v. 18, Dec. 1951, p. 539-542.

French work on chemical brightening, which adds to techniques for the metallographic study of aluminum alloys, and also has industrial applications. It is complementary to, rather than competitive with, electropolishing. (M21, L12, Al)

38-M. Metallography at Elevated Temperatures; Possibility of Gaseous Etching in New French Technique. J. Maréchal and M. Doucet. *Metal Treatment and Drop Forging,* v. 18, Dec. 1951, p. 565-571.

A technique and apparatus for examining structural changes of metal specimens at elevated temperatures. Results of work and the possibility of using gaseous etching on samples of Cu. Photomicrographs. (M21, Cu)

39-M. Asymmetrical Electron Diffraction Effects From Single Crystals of Silver. G. P. Thomson. *Proceedings of the Physical Society,* v. 64, sec. A, Dec. 1, 1951, p. 1113-1124.

Silver crystal surfaces, prepared by either electrolytic etching or electrolytic polishing, were studied by means of the electron-diffraction reflection technique. The fine structure effects showed certain asymmetries which do not immediately follow from Laue diffraction theory. Possible causes of these asymmetries are probably due to distortion of the silver crystals, or refraction effects. (M22, Ag)

40-M. A Scanning Device for Precision Determination of Lattice Parameters at Constant Temperatures. M. E. Straumanis and E. Z. Aka. *Review of Scientific Instruments,* v. 22, Nov. 1951, p. 843-844.

Lattice-parameter determinations can now be made with a precision of 0.0005% using powder or rotating-crystal methods and asymmetric film arrangement. Illustration and diagram. (M26)

41-M. Zirconium-Titanium System: Constitution Diagram and Properties. Earl T. Hayes, A. H. Roberson, and O. G. Paasche. *U. S. Bureau of Mines,* Report of Investigations 4826, Nov. 1951, 11 pages.

The Zr-Ti system was investigated over the entire range of compositions using both graphite-melted and arc-melted alloys. Thermal analysis, resistivity measurements, melting-point studies, and X-ray analysis were used to determine the phase relationships. Tests on mechanical properties were made. Tables and graphs. (M24, Q general, Ti, Zr)

42-M. Examples of Practical Use of X-Ray Diffraction Apparatus in Metallurgy. (In Czech.) P. Skulari. *Hutnické Listy,* v. 6, Oct. 1951, p. 489-494.

Some characteristic examples. (M22, S13)

43-M. Methods for Preparing and Examining Large Metallic Crystals. (In French.) Paul LaCombe. *Métaux: Corrosion—Industries,* v. 26, Oct. 1951, p. 392-409.

Seven different methods for preparing and examining single crystals and polycrystalline specimens. 58 ref. (M21)

44-M. Method of Identifying the Crystallographic Characteristics of Deformation and Fracture in Polycrystalline Solids. (In French.) C. A. Zapffe and F. K. Landgraf. *Revue de Métallurgie,* v. 48, Nov. 1951, p. 811-821.

"Fractographic" procedure. The crystallographic characteristics of Bi and Sb were studied. Fractographs, sketches, and tables. 17 ref. (M23, Bi, Sb)

45-M. Etch Patterns Produced Anodic Attack on Aluminum. Raymond Jacquesson and Jack Manenc. (In French.) *Revue de Métallurgie,* v. 48, Nov. 1951, p. 879-882.

A new process for studying crystal orientation in cold-worked Al. Illustrated. (M21, Al)

46-M. Certain Crystallo-Chemical Anomalies in the Systems Mg-Zn and Mg-Al-Cu. (In Russian.) M. S. Mirgalovskaia. *Doklady Akademii Nauk SSSR,* new ser., v. 78, June 11, 1951, p. 909-911.

Crystallographic anomalies exist in the Mg-Al-Cu system similar to those in the Mg-Zn system, in particular for MgZn, $MgZn_2$, and $MgZn_5$. Data are charted. (M26, Mg, Zn, Al, Cu)

47-M. Basic Pattern of Phase Equilibrium in Highly Coercive Fe-Ni-Al Alloys. O. S. Ivanov. *Doklady Akademii Nauk SSSR,* new ser., v. 78, June 21, 1951, p. 1157-1160.

Equilibrium diagrams for Fe-Ni-Al and for the 50 atm.% sections of the system were determined by physical properties, microstructures, thermal-expansion, and electrical-conductivity tests. (M24, Fe, Al, Ni)

48-M. Submicroscopic Structure of "Alni" Alloy. (In Russian.) N. N. Buinov and R. M. Lerinman. *Doklady Akademii Nauk SSSR,* new ser., v. 79, July 1, 1951, p. 69-72.

Electron microscope study shows structural differences of an alloy containing 25% Ni, 14% Al, 0.15% Cu, balance Fe, for different heat treatments. Corresponding coercive-force values are given. Photomicrographs. (M27, P16, Al, Ni, Fe)

49-M. Structures of Iron-Nickel-Aluminum Alloys for Permanent Magnets. (In Russian.) Iu Skakov. *Doklady Akademii Nauk SSSR,* new ser., v. 79, July 1, 1951, p. 77-80.

Metallographic analysis of Fe-Al-Ni alloys by means of optical and electron microscopes provides data for adding to and correcting Bradley and Taylor's diagram for this system. (M27, Fe, Al, Ni, SG-n)

50-M. Graphite; Its Crystal Structure in Cast Iron. W. S. Owen and B. G. Street. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 575-577; disc., p. 635-636.

Previously abstracted from *Journal of the Iron & Steel Institute.* See item 71-M, 1951. (M26, N8, CI)

51-M Carbide Phase; Structure in Iron-Carbon-Silicon Alloys. W. S. Owen. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 577-579; disc., p. 635-636.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 72-M, 1951. (M24, M26, CI, Fe)

52-M. Carbon; Metallography in 4% Silicon-Iron Alloys. E. D. Harry. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 580-583; disc., p. 637-639.

Previously abstracted from the *Journal of the Iron and Steel Institute.* See item 100-M, 1951. (M26, N8, Fe)

53-M. Solid Solutions; Classification of the Solubilities of Elements in Iron. Part II and III. I. I. Kornilov. *Iron & Steel,* v. 25, Jan. 1952, p. 25-30. (Translated from *Izvestiia Akademii Nauk SSSR)*

Part II: A classification of solid solutions higher than binary involving iron, based on the atomic diameters of the elements which form continuous (binary) solid sclutions with iron and among themselves. Corresponding to the two modifications of iron (α and γ), two classes of continuous solid solutions are considered: ferritic and austenitic. Part III: From the relation of the atomic diameters of the elements and of iron, a group of elements with a difference of atomic diameters of 8-15% which form binary limited solid solutions with iron is isolated. A systemization of ternary, quaternary, and higher limited solid solutions of ferrite is given on the basis of these elements, and the number of possible systems is calculated. 27 ref. (M24, Fe)

54-M. The Experimental Determination of the Distribution of the Valence Electrons in Crystals. (In English.) *Acta Crystallographica,* v. 4, Nov. 1951, p. 481-482.

Work of Ageev and coworkers on above for Al, Ni, and NiAl. Possible inaccuracies. 13 ref. (M26, Al, Ni)

55-M. A New Approach to Crystal-Structure Analysis. (In English.) M. J. Buerger. *Acta Crystallographica,* v. 4, Nov. 1951, p. 531-544.

Vector-set methods are applied to the solution of Patterson syntheses. The relation between these methods and those of Clastre and Gay, Garrido, Robertson, and McLachlan. (M26)

56-M. The Determination of Interplanar Spacings and Cell Dimensions From Powder Photographs Using an Internal Standard. (In English.) K. W. Andrews. *Acta Crystallographica,* v. 4, Nov. 1951, p. 562-563.

Typical data are charted. (M26)

57-M. (Book) **Typical Microstructures of Cast Iron.** 54 pages. 1951. British Cast Iron Research Association, Alvechurch, Birmingham, England. 15s. to members; 21s. to nonmembers.

A series of photomicrographs of the principal types of cast iron normally encountered by the metallurgist and engineer, at magnifications to which they are accustomed, are grouped under constituents of cast iron, unalloyed cast irons, special

and alloy cast irons, and malleable cast irons. A few photomicrographs illustrate some of the more common defects encountered in iron castings. (M27, CI)

N

TRANSFORMATIONS AND RESULTING STRUCTURES

26-N. Kinetics of Graphitization in Cast Iron. B. F. Brown and M. F. Hawkes. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 181-198; disc., p. 198-200.

The eutectoid decomposition of austenite to graphite and ferrite and also to pearlite was studied in a Mg-treated nodular iron. A possible mechanism for the effects of alloying elements on rates of graphitization is suggested. (N8, CI)

27-N. Isothermal Transformation Characteristics on Direct Cooling of Alloyed White Iron. F. B. Rote, G. A. Conger, and K. A. DeLonge. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 509-521; disc. p. 521-522.

Previously abstracted from Preprint 9. See item 116-N, 1951. (N8, CI)

28-N. Properties of Alloy Steels for High Temperature Service. II. *Industrial Heating,* v. 18, Dec. 1951, p. 2178, 2180, 2182, 2184.

Condensed version of "Isothermal Transformation, Hardening, and Tempering of 12 Per Cent Chromium Steel", R. L. Rickett, W. F. White, C. S. Walton, and J. C. Butler. Previously abstracted from *American Society for Metals.* Preprint 17, 1951. See item 236-N, 1951. (N8, J26, J29, SS)

29-N. Aging of Al-Cu Alloys. *Metal Progress,* v. 60, Dec. 1951, p. 108, 110, 114, 116. (Condensed from The Aging Characteristics of Binary Aluminum-Copper Alloys. H. K. Hardy.)

Previously abstracted from *Journal of the Institute of Metals.* See item 184-N, 1951. (N7, Al)

30-N. Grain-Boundary Diffusion in Metals. R. S. Barnes. *Metal Treatments and Drop Forging,* v. 18, Dec. 1951, p. 531-538.

Reviews past and present investigations on the mechanism of grain-boundary diffusion. An electrolytic method for determining the curve of constant concentration. A quantitative study is made from which a number of theories are deduced. Work on the Cu-Ni couple is illustrated. 21 ref. (N1, Cu, Ni)

31-N. The Recrystallization Texture of Drawn Aluminium Wire. J. Sawkill and N. Thorley. *Philosophical Magazine,* ser. 7, v. 42, Dec. 1951, p. 1369-1372.

Surveys previous literature. Results of an investigation show the existence of a minor (100) component. (N5, Al)

32-N. A Simplified Vacuum Furnace for Growing Metallic Monocrystals. John J. Gilman. *Review of Scientific Instruments,* v. 22, Nov. 1951, p. 854-855.

Advantages of this type of furnace design. Schematic diagram. (N12)

33-N. Kinetics of Isothermal Growth of Martensite Crystals. (In Russian.) B. Ia. Liubov. *Doklady Akademii Nauk SSSR,* new ser., v. 78, June 11, 1951, p. 895-898.

A series of equations is proposed describing the kinetics involved. These equations are interpreted for different values of the variables. (N8)

34-N. Nodule Genesis and Growth in Magnesium-Treated Hypoeutectic Irons. R. P. Dunphy and W. S. Pellini. *Foundry,* v. 80, Jan. 1952, p. 82-86, 195, 196, 198-200.

The nodule genesis and growth features of hypo-eutectic Mg-treated Fe were studied by examination of specimens quenched at various stages of solidification. It is deduced that nodules develop in close proximity to dendrites at the end-stage of austenite formation, immediately prior to the start of eutectic reaction. Nodule growth is believed to result from the malleablization of ledeburite. Gives cooling curves and microstructures. 11 ref. (N12, Fe, CI)

35-N. Martensitic Steels; Structural Transformations in Tempering. K. H. Jack. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 626-630.

Previously abstracted from the *Journal of the Iron and Steel Institute.* See item 260-N, 1951. (N8, J29, ST)

36-N. Iron-Carbon Alloys; Tempering of Martensite and Retained Austentite. J. Crangle and W. Sucksmith. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 630-634.

Previously abstracted from the *Journal of the Iron and Steel Institute.* See item 173-N, 1951. (N8, P16, CN)

37-N. Recrystallization of Tungsten. A. L. Simmons. *Metal Industry,* v. 79, Dec. 21, 1951, p. 519-520.

Results of experimental work on the annealing and recrystallization of tungsten and suitable maximum swaging temperatures. Graphs and tables. (N5, J23, F22, W)

38-N. Diffuse Scattering by an Ordering Alloy. (In English.) J. B. Newkirk, R. Smoluchowski, A. H. Geisler, and D. L. Martin. *Acta Crystallographica,* v. 4, Nov. 1951, p. 507-512.

At an early stage of the ordering reaction process in CoPt crystals, thin platelets of the ordered phase form on (110) planes of the disordered matrix phase. These platelets are coherent with the matrix. Since (110) planes of the two phases are not identical, when each is in an unstrained condition, they mutually strain each other, causing characteristic diffuse X-ray diffraction effects and the marked changes in physical properties previously reported. (N10, Co, Pt)

P

PHYSICAL PROPERTIES AND TEST METHODS

34-P. Surface Chemical Phenomena in Lubrication. J. E. Brophy and W. A. Zisman. *Annals of the New York Academy of Sciences,* v. 53, art. 4, June 27, 1951, p. 836-861.

Structure and mechanical properties of monolayers of amphipathic molecules adsorbed on metals; and surface chemical reactions of polar compounds with common metals. Data for specific compounds adsorbed on different metals and metal powders. Rust-inhibitive properties. Wear curves for steel on steel using different lubricants and four-ball tester. (P13, R10, Q9, ST)

35-P. The Electrical Resistivity of Gallium and Some Other Anisotropic Properties of This Metal. R. W. Powell. *Proceedings of the Royal Society,* ser. A, v. 209, Nov. 22, 1951, p. 525-541.

Single crystals of gallium can be produced with considerable ease. These crystals show greater anisotropy in their conducting properties than those of other metals. It is believed that thermal conductivity varies as much as does electrical conductivity and that mechanical properties will also prove to be markedly anisotropic. 20 ref. (P15, P12, Q general, Ga)

36-P. Electrical Resistivity of Gallium Single Crystals at Low Temperatures. Marianne Olsen-Bär and R. W. Powell. *Proceedings of the Royal Society,* ser. A, v. 209, Nov. 22, 1951, p. 542-550.

A detailed investigation was made over the range 20.4-4.2°K. The anisotropy of this property increases in this region where the resistivity ratios for the three specimens are approximately 1:2.1:8 compared with 1:2.1:6.5 at room temperature. (P15, Ga)

37-P. Variation of Resistivity of Thin Metallic Films as a Function of Thickness and of Temperature. (In French). J. P. Borel. *Helvetica Physica Acta,* v. 24, Sept. 20, 1951, p. 389-400.

Results of study on thin films of silver. (P15, Ag)

38-P. Mechanism of Magnetic Breaks. (Preliminary Report). (In German.) Th. Hofbauer and K. M. Koch. *Zeitschrift für Physik,* v. 130, Oct. 9, 1951, p. 409-414.

Experiments show that an auxiliary field of higher frequency promotes formation and course of magnetic breaks and thus increases saturation magnetization and remanence. Results of experiments on Ni wire and on Fe-Ni sheet are described and shown by means of oscillograms. (P16, Fe, Ni)

39-P. Investigation of "Thick" Metal Layers and Their Surface Layers With the Aid of the "Absolute Phase". (In German.) Herwig Schopper. *Zeitschrift für Physik,* v. 130, Oct. 9, 1951, p. 427-444.

Possible new methods and a process for determining the index of the layers. Refractive index of silver and thickness of transition layers (on exposed side of metal layer) were also investigated. 16 ref. (P17)

40-P. Measuring Vapor Pressures and Coefficients of Condensation of Iron, Cadmium, and Silver. (In German.) Günter Wessel. *Zeitschrift für Physik,* v. 130, Oct. 9, 1951, p. 539-548.

Procedures. Diagrams, tabulated and graphed data. 20 ref. (P12, Fe, Cd, Ag)

41-P. The Solubility of Gold. Konrad B. Krauskopf. *Economic Geology and the Bulletin of the Society of Economic Geologists,* v. 46, Dec. 1951, p. 858-870.

The solubilities of Au in various solutions calculated from thermodynamic data agree reasonably well with experimental results. Data are tabulated. 16 ref. (P13, Au)

42-P. The Heat of Combustion of Magnesium and Aluminum. Charles E. Holley, Jr. and Elmer J. Huber, Jr. *Journal of the American Chemical Society,* v. 73, Dec. 1951, p. 5577-5579.

Previously abstracted from U. S. A.E.C. AECU-1172. See item 152-P, 1951. (P12, Al, Mg)

43-P. Thermal Properties of the Alkali Metals. I. The Heats of Reaction of Sodium and Potassium With Water at 25°. II. The Heats of Formation of Some Sodium-Potassium Alloys at 25°. Eugene E. Ketchen and W. E. Wallace. *Journal of the American Chemical Society,* v. 73, Dec. 1951, p. 5810-5814.

28 references. (P12, Na, K, P)

44-P. Nomogram for Comparing the Weights of Magnesium, Aluminum and Steel. *Materials & Methods,* v. 34, Dec. 1951, p. 105.

A simple means for calculating and comparing weights, also for general multiplication and division. (P10, Mg, Al, ST)

45-P. The Influence of Deviations From the Debye Spectrum on the Electrical Conductivity of Metals. F. H. J. Cornish and D. K. C. Mac-

Donald. *Philosophical Magazine,* ser. 7, v. 42, Dec. 1951, p. 1406-1410.

A survey. Data are tabulated and graphed. 14 ref. (P15)

46-P. On the Calculation of Characteristic Temperatures From the Elastic Constants. M. Blackman. *Philosophical Magazine,* ser. 7, v. 42, Dec. 1951, p. 1441-1442.

Presents a formula for calculating Θ_0 values from elastic constants. Cases of alloys which are elastically anisotropic. Data are tabulated for Ag, Au, and representative Ag-Au alloys. (P12, Q21, Ag, Au)

47-P. Resonance-Region Neutron Spectrometer Measurements on Silver and Tungsten. W. Selove. *Physical Review,* ser. 2, v. 84, Dec. 1, 1951, p. 869-876.

The first use of the resonance region time-of-flight spectrometer for measurements of neutron-transmission properties. One of the principal advantages of this instrument is that comparatively small samples are required, and measurements can be made on many comparatively rare materials. (P10, Ag, W)

48-P. Total Neutron Cross Sections of Cobalt, Manganese, and Molybdenum. Warren Fenton Subbins. *Physical Review,* ser. 2, v. 84, Dec. 1, 1951, p. 902-905.

Experimental procedure and results of measurement. Graphs. (P10, Co, Mn, Mo)

49-P. The Stopping Power of Metals and Semiconductors. Z. H. Heller and D. J. Tendam. *Physical Review,* ser. 2, v. 84, Dec. 1, 1951, p. 905-909.

A study of the dependence of nuclear-radiation stopping power on velocity and atomic number. An empirical formula derived from tnese data expresses the electronic stopping power relative to Al as a function of energy and atomic number over a wide range. (P10)

50-P. Neutron Scattering and Polarization by Ferromagnetic Materials. C. G. Shull, E. O. Wollan, and W. C. Koehler. *Physical Review,* ser. 2, v. 84, Dec. 1, 1951, p. 912-921.

Studies of intensity distribution and polarization of the scattered neutron radiation from both unmagnetized and magnetized ferromagnetic substances. The form factor dependence of magnetic scattering, the basic nature of the neutron's magnetic interaction, and the magnetic structure existing in certain ferromagnetics. (P16)

51-P. Magnetostrictive Vibration of Prolate Spheroids. Analysis and Experimental Results. F. J. Beck, J. S. Kouvelities, and L. W. McKeehan. *Physical Review,* ser. 2, v. 84, Dec. 1, 1951, p. 957-963.

Through an analysis of this vibrational system, a method is developed whereby values may be computed for the incremental permeability, magnetostriction constant, modulus of elasticity, and dissipation constant of the ferromagnetics. Annealed specimens of nickel and of several Ni-Fe alloys, as well as of Ni in the unannealed state, were tested. (P16, Ni, Fe)

52-P. Thermal Conductivities of Pure Metals at Low Temperatures. I. Aluminum. F. A. Andrews, R. T. Webber, and D. A. Spohr. *Physical Review,* ser. 2, v. 84, Dec. 1, 1951, p. 994-996.

Thermal conductivities of three specimens of pure Al were measured in the range 2-20° K. All specimens showed maximum conductivities between 14 and 17° K. Measured values are compared with the theory of Sondheimer. 22 ref. (P11, Al)

53-P. Sintered Copper With Extremely High Conductivity. F. Pawlek. *Powder Metallurgy Bulletin,* v. 6, Dec. 1951, p. 83.

Experiments run to confirm results of investigators on the effect of O_2 and H_2 on the electrical conductivity of Cu. (P15, H general, Cu)

54-P. Some Special Characteristics of Soft Magnetic Materials Used in Instrument Manufacture. G. A. V. Sowter. *Proceedings of the Institution of Electrical Engineers,* v. 98, pt. 2, Dec. 1951, p. 714-727, disc., p. 753-759.

Merits of a number of high-permeability magnetic alloys under a variety of conditions likely to be met in instrument practice. The properties found with d.c., a.c. and combined a.c.-d.c. operation. Recommendations for the best alloy to be employed in particular circumstances. Information on the spread of the magnetic characteristics of Mumetal spiral cores on a commercial scale. (P16, T8, Ni, SG-p)

55-P. Contact Resistance—the Contribution of Nonuniform Current Flow. W. B. Kouwenhoven and W. T. Sackett, Jr. *Transactions of the American Institute of Electrical Engineers,* v. 70, pt. 1, 1951, p. 791-795.

Results of the study provide an explanation of spreading resistance. Curves are presented for calculating its magnitude for single and multiple constricting contacts. (P15)

56-P. On the Magnetic Hysteresis Losses in Magnetostriction Vibration. Yoshimitsu Kikuchi and Hiroshi Shimizu. *Science Reports of the Research Institutes, Tohoku University,* ser. B, v. 1-2, Mar. 1951, p. 365-379.

Theoretical analysis followed by results of experiments on symmetrical and unsymmetrical magnetic hysteresis losses of Ni under various tensions. Graphs and diagrams. (P16, Ni)

57-P. Method of Measuring the Electrical Conductivity of Metallic Crystals and Melts. (In German.) Adolf Knappwost. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 55, Oct. 1951, p. 598-600.

In the method described, electrical conductivity of metal may be determined in the range from the melting point to room temperature. The specimen is located in the magnetic field of force of a coil carrying an alternating current. Includes circuit diagram, graphs, and references. (P15)

58-P. Flow Method for Determining the Adsorption Times of Gas Molecules on Metal Surfaces. (In German.) Werner Brandt. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 55, Oct. 1951, p. 652-654.

Experiments to measure the adsorption time of a series of gases on Pt-Cu alloy wires. (P13, Pt, Cu)

59-P. The Change of Wettability of Platinum by the Action of Different Gases. (In Russian.) I. N. Plaksin and S. I. Vladimirov. *Doklady Akademii Nauk SSSR,* new ser., v. 78, June 11, 1951, p. 933-935.

Results of a study of the influence of oxygen, air, argon, nitrogen and CO_2 on the surface in relation to the flotation properties of minerals. Data are charted. (P10, B14, Pt)

60-P. Formulas for Calculation of the Surface Tension of Metals. (In Russian.) L. L. Kunin. *Doklady Akademii Nauk SSSR,* new ser., v. 79, July 1, 1951, p. 93-96.

Surface tensions were calculated using equations proposed by various authors and compared with experimental values for Fe and a wide variety of nonferrous metals. Data are tabulated. 16 ref. (P10)

61-P. Thermodynamic Functions of Al_4C_3, Si, SiO_2, SiC, AlF_3, and $Na_3Al\ F_6$. (In Russian.) L. I. Ivanova. *Zhurnal Obshchei Khimii,* v. 21(83), Mar. 1951, p. 444-452.

Calculated theoretically, tabulated, graphed, and discussed. 24 ref. (P12, Si, C-n)

62-P. Transformer Sheet; Variation in Electrical Properties. S. Rushton and D. R. G. Davies. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 583-589; disc., p. 637-639.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 145-P, 1951. (P15, Fe)

63-P. Cast Irons; Growth Characteristics. W. C. Heselwood and F. B. Pickering. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 596-600; disc., p. 639-644.

Previously abstracted from the *Journal of the Iron and Steel Institute.* See item 258-P, 1951. (P10, CI)

64-P. Thermal Conductivity of Liquid Sodium and Potassium. C. T. Ewing, J. A. Grand, and R. R. Miller. *Journal of the American Chemical Society,* v. 74, Jan. 5, 1952, p. 11-14.

Conductivity coefficients were measured for liquid Na and K with a longitudinal heat flow apparatus —sodium to 510 and potassium to 610° C. An apparatus for accurate measurement of high-boiling metals to 600° C. The ideality of the pure-liquid-metal media is shown by the conformation of the conductivity values to empirical and theoretical postulations. 12 ref. (P11, Na, K)

65-P Magnesium-Cadmium Alloys. II. The Use of the Electrochemical Cell to Determine the Heats, Free Energies and Entropies of Formation of the Solid Alloys in the Temperature Range Above the Order-Disorder Curie Points. Forrest A. Trumbore, W. E. Wallace, and R. S. Craig. **III. Some Calorimetrically Determined Heats of Formation at 25°.** Thomas M. Buck, Jr., W. E. Wallace, and Richard M. Rulon. *Journal of the American Chemical Society,* v. 74, Jan. 5, 1952, p. 132-139.

35 references. (P12, Mg, Cd)

66-P. The Vapor Pressures of Tellurium and Selenium. L. S. Brooks. *Journal of the American Chemical Society,* v. 74, Jan. 5, 1952, p. 227-228.

Measured with quartz Bourdon gages, at pressures up to about 1/3 atm. for Te and just over 1 atm. for Se. 17 ref. (P12, Te, Se)

67-P. "Corbino Effect" and Magnetic Resistance Change in Bismuth. (In German.) L. Halpern and K. M. Koch. *Acta Physica Austriaca,* v. 5, Nov. 1951, p. 129-133.

Corbino's modified method of determining Hall constant, and its application to Bi disks at about 90° K. A field of only 700 oersteds effected a 51.8% increase in resistance of the full disk, while the resistance increase dropped to 38% when the disc was slit from circumference to center. Includes diagrams. (P16, Bi)

68-P. The Effect of Trace Elements in Pure Copper. (In German.) H. J. Wallbaum. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 4, Oct. 1951, p. 377-383.

Results of experiments with electrolytic Cu wire show that various trace elements greatly affect the electrical properties and crystal structure of copper. Includes graphs, tables, and X-ray diagrams. (P15, M26, Cu)

69-P. Study of Thin Absorbent Layers With the Aid of the Absolute Phase. (In German.) Herwig Schopper. *Zeitschrift für Physik,* v. 130, Nov. 13, 1951, p. 565-584.

Old and new methods of determining optical constants and layer thickness. The assumption that spatially dispersed globules form the layers will not explain the behavior of thin metal layers, but experimental and theoretical results agree when it is assumed that the layers are composed of spheroids and that their axial ratios are statistically distributed about a probable value. Includes graphs and tables. 20 ref. (P17)

70-P. Magnetic Susceptibility of Gray Tin. (In German.) G. Busch and

E. Mooser. *Zeitschrift für physikalische Chemie*, v. 198, Nos. 1-4, Oct. 1951, p. 23-29.

Magnetic susceptibility is composed of three parts, namely: the thermally independent diamagnetism of Sn atoms, the thermally dependent diamagnetism of free charge carriers, and the paramagnetism of Mg ions (if present) acting as acceptors. Includes graphs. (P16, Sn)

71-P. Effect of Impurities on the Initial Permeability of Materials. (In German.) Martin Kersten. *Zeitschrift für physikalische Chemie*, v. 198, Nos. 1-4, Oct. 1951, p. 89-106.

Explains theoretically the fact that slight impurities reduce initial permeability of commercially pure Fe more than initial permeability of reversible Ni-Fe alloys containing 40-100% Ni. Charts and diagrams. 19 ref. (P16, Ni, Fe)

72-P. (Book) **Karl A. Hofmann: Anorganische Chemie (Karl A. Hofmann's Inorganic Chemistry.)** Ed. 14. Ulrich Hofmann and Walter Rüdorff. 864 pages. 1951. Friedr. Vieweg & Sohn, Braunschweig, Germany.

A handbook for the experienced chemist as well as a textbook for the student. Properties, occurrence, preparation, and use of elements in organic compounds. Includes diagrams, tables, and the spectra of several elements. (P13)

Q

MECHANICAL PROPERTIES AND TEST METHODS; DEFORMATION

85-Q. Plastic-Wave Propagation Effects in High-Speed Testing. E. H. Lee and H. Wolf. *Journal of Applied Mechanics*, v. 18, *(Transactions of the American Society of Mechanical Engineers*, v. 73), Dec. 1951, p. 379-386.

A material test carried out at high speed may be markedly influenced by plastic-wave propagation effects. In such a case, variation of strain occurs along the test specimen, and the stress-strain relation cannot be determined from measurements made on the specimen as a whole. The theoretical plastic-wave analysis of a particular test arrangement is given. Range of speed is determined which permits satisfactory interpretation without need for detailed analysis of plastic-wave propagation. Application to other test arrangements. (Q27)

86-Q. Protecting Refinery Pressure Equipment From Graphitization. D. B. Rossheim, J. J. Murphy, R. H. Caughey, and Q. B. Hoyt. *Petroleum Processing*, v. 6, Dec. 1951, p. 1385-1388.

Results of studies of carbon and low-alloy steel metal deterioration in some catalytic-cracking equipment. Precautions to be taken and materials for new construction. Causes of cracking, including stresses in bimetallic construction.
(Q25, N8, CN, AY)

87-Q. Flexural Fatigue Strengths of Riveted Box Beams—Alclad 14S-T6, Alclad 75S-T6, and Various Tempers of Alclad 24S. I. D. Eaton and Marshall Holt. *National Advisory Committee for Aeronautics*, Technical Note 2452, Nov. 1951, 25 pages.

Results of an investigation. 11 ref.
(Q7, Al)

88-Q. Melt Quality and Fracture Characteristics of 85-5-5-5 Red Brass and 88-8-4 Bronze. R. D. Shelleng, C. Upthegrove, and F. B. Rote. *Transactions of the American Foundrymen's Society*, v. 59, p. 67-76; disc., p. 76-78.

Previously abstracted from Preprint 55. See item 284-Q, 1951.
(Q26, E25, Cu)

89-Q. Mechanical Properties of Cast Steel as Influenced by Mass and Segregation. John F. Wallace, John H. Savage, and Howard F. Taylor. *Transactions of the American Foundrymen's Society*, v. 59, 1951, p. 223-242; disc., p. 242-243.

Investigation on four heats of various low-alloy steels.
(Q general, M27, ST)

90-Q. Effect of Vanadium on the Properties of Cast Chromium-Molybdenum Steels. N. A. Ziegler, W. L. Meinhart, and J. R. Goldsmith. *Transactions of the American Foundrymen's Society*, v. 59, 1951, p. 261-274; disc., p. 274-275.

Previously abstracted from Preprint 2. See item 281-Q, 1951.
(Q general, M27, N8, K9, CI)

91-Q. Influence of Silicon Content on Mechanical and High-Temperature Properties of Nodular Cast Iron. W. H. White, L. P. Rice, and A. R. Elsea. *Transactions of the American Foundrymen's Society*, v. 59, 1951, p. 332-345, disc., p. 345-347.

Previously abstracted from Preprint 5. See item 282-Q, 1951.
(Q general, P general, CI)

92-Q. Silicon-Chromium Alloy in Complicated Iron Castings. Ralph A. Clark. *Transactions of the American Foundrymen's Society*, v. 59, 1951, p. 401-409; disc., 409-411.

Four automobile cylinder castings were poured from cylinder grades of cast iron alloyed in various ways. Mechanical properties were determined for the various specimens. Variations in cooling rate brought about wide variations in microstructure and hardness.
(Q general, M27, E25, CI)

93-Q. Effect of Phosphorus Content on Mechanical Properties of a Nodular Cast Iron. J. E. Rehder. *Transactions of the American Foundrymen's Society*, v. 59, p. 501-508; disc., p. 508.

Previously abstracted from Preprint 43. See item 283-Q, 1951.
(Q general, E25, CI)

94-Q. A Castability and Property Comparison of Several Magnesium-Rare Earth Sand Casting Alloys. K. E. Nelson and F. P. Strieter. *Transactions of the American Foundrymen's Society*, v. 59, 1951, p. 532-543; disc., p. 543-545.

Castability and tensile and creep properties of aircraft engine castings made from a group of Mg-rare earth alloys were investigated.
(Q27, Q3, E25, Mg)

95-Q. The Influence of Surface Films on the Friction, Adhesion, and Surface Damage of Solids. F. P. Bowden. *Annals of the New York Academy of Sciences*, v. 53, art. 4, June 27, 1951, p. 805-823.

Reviews some recent experimental investigations on the part played by surface films in the friction and adhesion of solids. The bearing of these results on the theory of friction. 16 ref. (Q9)

96-Q. Measurement of the Incremental Friction Coefficient of Several Homologous Series of Straight-Chain Hydrocarbon Compounds. S. F. Murray and J. T. Burwell. *Annals of the New York Academy of Science*, v. 53, art. 4, June 27, 1951, p. 906-918.

Coefficient was measured as a function of rotation of one low-carbon steel cylinder against another one for a number of straight-chain polar hydrocarbons, which included alcohols, acids, amines, and two esters. Five of the alcohols were also tested using 24S-T Al alloy cylinders. 15 ref. (Q9, CN, Al)

97-Q. Influence of Roughness and Oxidation on Wear of Lubricated Sliding Metal Surfaces. C. B. Davies. *Annals of the New York Academy of Science*, v. 53, art. 4, June 27, 1951, p. 919-935.

Measurements were made, at room temperature, of the wear of a flat steel annulus flooded with lubricant and pressing against the lower end of a small vertical cylindrical tungsten carbide pin. In another apparatus, reciprocating motion produced rubbing of Ag-Cu combinations and mild steel against Ni-Cr steel in oxygen, nitrogen, or air. Effects of surface-active agents and of other chemicals on wear and corrosion were studied.
(Q9, R2, Ag, Cu, CN, AY)

98-Q. The Luders Deformation of Mild Steel. *Proceedings of the Physical Society*, v. 64, ser. B. Dec. 1, 1951, p. 1085-1086.

Experiments extended to the "blue-brittle" range—around 200° C. Here the deformed area just beyond the Lüders front ages very rapidly during the test, so that yield stress in this region is much above applied stress. After testing, marked curvature remains in the sample.
(Q24, CN)

99-Q. Abrasion and Polishing, Friction and Wear. P. Dinichert. *Microtecnic* (English Ed.), v. 5, Sept.-Oct. 1951, p. 225-232.

The necessity for considering submicroscopic or even atomic dimensions when questions on the above are dealt with. Reference to this phenomenon in metals. (Q9, L10)

100-Q. New Applications of the Micromachine Type MI/44. S. A. Sadamel. *Microtecnic* (English Ed.), v. 5, Sept.-Oct. 1951, p. 233-240.

Machine for tensile testing of metal wires and strips and of textile threads and fibers. Tests on 18-8 stainless cold worked wire are shown as examples. (Q27, SS)

101-Q. Study of Some Properties of Nodular Graphite Cast Irons. (Concluded) (In French.) Marcel Ballay, Raymond Chavy and Jacques Grilliat. *Fonderie*, Oct. 1951, p. 2636-2651, disc, p. 2651-2652.

Mechanical properties, technique of tensile testing, comparison with properties of American malleable cast iron, and comparison of cast iron and steel ductility.
(Q general, Q27, CI)

102-Q. Creep Tests on Steel Wire at Room Temperature. (In German.) Alfred Krisch. *Archiv für das Eisenhüttenwesen*, v. 22, Sept.-Oct. 1951, p. 313-316.

Tests were made over a period of more than 1000 hr. on five patented steel wires and on one type of wire subjected to a final oil quench. Details of tests; behavior of the wires in reinforced concrete. 10 ref.
(Q3, ST)

103-Q. Mathematics of the Tensile Test. (In German.) Hans Kostron. *Archiv für das Eisenhüttenwesen*, v. 22, Sept.-Oct. 1951, p. 317-324; disc., p. 324-325.

Proposes equation making possible the calculation of various stresses. Practical application of mode of calculation is indicated. 16 ref. (Q27)

104-Q. Correlation Between Stress and Deformation Gradient. Part 2. Influence of Form and Scale. (In German.) Franz Bollenrath and Alex Troost. *Archiv für das Eisenhüttenwesen*, v. 22, Sept.-Oct. 1951, p. 327-335.

Theoretically investigates and diagrams a new method for designating the influence of irregular stress and deformation distribution upon the hindering of plastic deformation. The terms used are indexed. Practical application is suggested. 11 ref.
(Q23)

105-Q. The Behavior of Sintered Iron During Nitriding. (In German.) Werner Koster and Josef Raffelsieper. *Archiv für das Eisenhüttenwesen*, v. 22, Sept.-Oct. 1951, p. 337-341.

Microstructure, density, hardness, and bend strength of various Fe-powder sintered bodies were determined.
(Q29, Q5, P10, M27, J28, Fe)

106-Q. A Survey of Recent Research on Creep of Engineering Materials. Joseph Marin. *Applied Mechanics Reviews*, v. 4, Dec. 1951, p. 633-634.
48 references. (Q3)

107-Q. The Effect of Hydrogen on Steel and Formation of Hair-Line Cracks. A. B. Chatterjea and B. R. Nijhawan. *Current Science*, v. 20, Apr. 1951, p. 20, 90-91. (Reprint)
A review. 26 ref. (Q general, ST)

108-Q. A Piezoelectric Method for Determining Young's Modulus and Its Temperature Dependence. H. E. Stauss, F. E. Martin, and D. S. Billington. *Journal of the Acoustical Society of America*, v. 23, Nov. 1951, p. 695-696.
A resonance method for determining Young's modulus in metals is based on support of the specimen at its central node for longitudinal vibrations, with the supporting rod articulating at its lower end with a piezoelectric crystal. Utility of the method was extended by adapting it to measurement of changes in Young's modulus with temperature. (Q21)

109-Q. Use of Rare Earth Metals in Magnesium Casting Alloys. J. C. McDonald. *Light Metal Age*, v. 9, Dec. 1951, p. 13-14, 16.
Characteristics sought in casting alloys for service at elevated temperatures. Mechanical properties and behavior in the foundry of Mg—rare earth metal alloys. Advantages over Mg-Al-Zn type alloys.
(Q general, E25, Mg, SG-h)

110-Q. The Hardness Test as a Measure of Micro-Porosity in Aluminum and Magnesium Castings. Harry Czyzewski. *Light Metal Age*, v. 9, Dec. 1951, p. 24, 26.
Method utilizing simple hardness testing and charting of data for the control of microporosity. Considerably simplifies the production control of this factor. Advantages and practical applications of this method. (Q29, E25, Al, Mg)

111-Q. Scales for Determining Stiffness and Strength of Structural Metals. *Materials & Methods*, v. 34, Dec. 1951, p. 107.
A series of logarithmic scales arranged to provide a means for finding the relative sheet, plate, or beam thickness required for various metals of equal stiffness or equal strength, respectively.
(Q23, ST, Cu, Ti, Al, Mg)

112-Q. Influence of Microstructure on Creep Resistance. Georges Delbart and Michael Ravery. *Metal Progress*, v. 60, Dec. 1951, p. 62-68.
Results of an investigation. Material used was a Cr-Mo steel. Tests showed that there was a strong influence of microstructure on the surface performance of low-alloy, high-temperature steels. Data are tabulated and graphed. Micrographs. (Q3, M27, AY, SG-h)

113-Q. Simple Tester for Hardness of Hot Materials. R. F. Domagala and W. R. Johnson. *Metal Progress*, v. 60, Dec. 1951, p. 72-73.
A rapid, reproducible method for testing hot hardness of materials at temperatures approaching their melting points. Examples of tests on Mo, Si, and VSi_2. (Q29, Mo, Si)

114-Q. Properties of Nimonic Alloys. *Metal Progress*, v. 60, Dec. 1951, p. 80-B.
Charts and tables on the chemical composition, physical and mechanical properties, and heat treatments of Nimonic Alloys.
(Q general, P general, J23, J27, Ni)

115-Q. Jigs for Positioning Keyhole Notch. C. D. Foulke. *Metal Progress*, v. 60, Dec. 1951, p. 81.
Two jigs for the uniform preparation of keyhole notch-impact specimens. (Q6)

116-Q. High Purity Zirconium Metal. F. B. Litton. *Metal Progress*, v. 60, Dec. 1951, p. 83-86.
Results of an investigation. The work-hardening curves for iodide and arc melted iodide zirconium were similar, except that approximate maximum hardnesses were attained at 70 and 60% cold reduction, respectively. The maximum hardness was Rockwell A-52 for both materials after 90% cold reduction. The penetration of O_2 into Zr at 1020, 1380 and 1740° F. was determined for 2-hr. heating periods in still air. Hardness measurements showed that approximately 0.35-mm. penetration occurred at 1380 and 1740° F. Micrographs. (Q29, Q24, Zr)

117-Q. Shock Wave Propagation in Metals. Werner Goldsmith. *Metal Progress*, v. 60, Dec. 1951, p. 92-96.
Shock loading represents the exact opposite of static loading and consists of the instantaneous application of an external force to a structural member. Types of waves resulting from impact loading are compression waves, rarefaction, shear, bending, and two types of surface waves. Tests were conducted on mild steel. (Q6, CN)

118-Q. Fracture of Metals. *Metal Progress*, v. 60, Dec. 1951, p. 148, 150. (Condensed from "The Fracture Process in Plastic Metals", Ya. G. Fridman and T. K. Zilova.)
Previously abstracted from *Doklady Akademii Nauk SSSR*. See item 780-Q, 1950. (Q26, ST)

119-Q. Strains and Stresses. *Metal Progress*, v. 60, Dec. 1951, p. 162, 164. (Condensed from "Concentration of Strains and Stresses at Large Plastic Strains," Ya. B. Fridman and T. K. Zilova).
Previously abstracted from *Doklady Akademii Nauk SSSR*. See item 835-Q, 1950. (Q24, Q25)

120-Q. A Study of Elastic and Plastic Stress Concentration Factors Due to Notches and Fillets in Flat Plates. Herbert F. Hardrath and Lachlan Ohman. *National Advisory Committee for Aeronautics*, Technical Note 2566, Dec. 1951, 23 pages.
Six large 24S-T3 Al alloy sheet specimens containing various notches or fillets were tested in tension to determine their stress concentration factors in both the elastic and plastic ranges. Diagrams and graphs. 12 ref. (Q27, Al)

121-Q. A Study of Slip Formation in Polycrystalline Aluminum. Aldie E. Johnson Jr., and S. B. Batdorf. *National Advisory Committee for Aeronautics*, Technical Note 2576, Dec. 1951, 18 pages.
Experimental results shed light on the assumptions that have been made in several attempts to bridge the gap between physical and mathematical theories of plasticity. The results are compatible with, but do not necessarily verify, the conception that plastic deformation in strain-hardening materials is primarily due to slip. Photomicrographs. (Q24, Al)

122-Q. On the Angular Distribution of Slip Lines in Polycrystalline Aluminum Alloy. John M. Hedgepeth, S. B. Batdorf, and J. Lyell Sanders, Jr. *National Advisory Committee for Aeronautics*, Technical Note 2577, Dec. 1951, 18 pages.
An attempt to assess quantitatively the adequacy of a model used by examining the statistical distribution of slip angles—those angles which express the orientation of slip lines. Theoretical distributions are derived on the basis of the model and are compared with an experimental distribution obtained from previous investigations. Photomicrographs. (Q24, Al)

123-Q. Relations Beteen the Modulus of Elasticity of Binary Alloys and Their Structure. Werner Koster and Walter Rauscher. *National Advisory Committee for Aeronautics*, Technical Memorandum 1321, Nov. 1951, 49 pages. (Translated.)
Previously abstracted from *Zeitschrift für Metallkunde*. See item 4C-19, 1949. (Q21, M27)

124-Q. Elevated Temperature Properties of Titanium Carbide Base Ceramals Containing Nickel or Iron. A. L. Cooper and L. E. Colteryahn. *National Advisory Committee for Aeronautics*, Research Memorandum E51110, Dec. 3, 1951, 47 pages.
The properties studied were oxidation, modulus of rupture, tensile strength, and thermal-shock resistance. Metallographic structure was studied. Tables, graphs, and micrographs. 13 ref.
(Q general, R2, M27, C-n, Ti)

125-Q. Formula for Creep Curves of Metals. E. N. Da C. Andrade. *Nature*, v. 168, Dec. 8, 1951, p. 1007.
Compares a 3-constant and a 4-constant formula. (Q3)

126-Q. Damping Capacity Measurements as an Aid to the Metallurgist. E. Linacre. *Research*, v. 4, Dec. 1951, p. 540-541.
Technique of damping capacity measurements. Use in determination of diffusion coefficients, grain size, intensity of magnetization and phase change on transformation. (Q8, M23)

127-Q. Some Experience With Boiler Plate in Penstock Construction. W. Müller. *Sulzer Technical Review*, no. 2, 1951, p. 12-24.
Examples of difficulties encountered with plate material for high-pressure pipe lines, and suggestions as to how they can be avoided or remedied. Includes information on mechanical properties, specifications, inspection, welding, and heat treatment. (Q general, S21, S22, CN)

128-Q. The Development of Aluminum-6 Per Cent Magnesium Wrought Alloys for Elevated-Temperature Service. K. Grube and L. W. Eastwood. *U. S. Atomic Energy Commission*, AECD-3003, July 15, 1950, 28 pages.
It was found that addition of 0.5% Cr and approximately 0.10% Ti produces an alloy which, after stabilization at 600° F. prior to test, has higher tensile properties at room temperature and at 600° F. than does 24S. Data are tabulated and graphed. (Q27, Al)

129-Q. Development of Low Alloy High Tensile Structural Steel. I. M. Mackenzie and J. M. Pow. *West of Scotland Iron and Steel Institute Journal*, v. 57, 1949-50, p. 85-116; disc., p. 117-124.
The effect of composition and heat treatment on resistance to plastic deformation, resistance to rupture, ability to relieve local stress concentrations, and ease of fabrication with particular reference to economic considerations. The importance of basing design on a proof-stress criterion in order to obtain the maximum benefit from high-tensile steels is emphasized. Recent developments in the C-Mn and Mn-Mo type of steels. (Q23, Q25, AY)

130-Q. Symposium on Residual Elements in Steel. Factors Affecting the Rolling and Hot Working of Mild Steel Plates. E. C. Houston. **The Effect of Residual Elements in Steel on the Manufacture of Steel Tubes.** W. A. Smith. **Residual Elements in Steel.** H. Harris. *West of Scotland Iron and Steel Institute Journal*, v. 57, 1949-50, p. 193-235; disc., p. 236-241.
Causes of defects which may arise during the hot processing and welding of mild steel plates and tubes. Effects of high sulfur resulting from pick-up from the furnace atmosphere or from segregation. Effect of residual alloys. Small quantities of Sn, Cu, and Ni were shown to have a bad effect as determined

by hot bend tests. Method of scale formation and the formation of low melting point constituents in the scale resulting in grain-boundary attack. Results are tabulated, graphed, and illustrated.
(Q general, F23, F26, CN)

131-Q. Hard Metals (Sintered Carbides) as Tools for Cold Working Operations. (In Czech.) M. Petrdlik. *Hutnické Listy,* v. 6, Oct. 1951, p. 484-489.
Production of hard alloys of the WC-Co type containing up to 30% Co. Variations in mechanical properties with Co content. Three examples of the use of hard metals containing a high percentage of Co for cold working operations. Diagrams, graphs, tables, and illustrations.
(Q general, T5, C-n)

132-Q. Determination of Residual Strains in Sintered Pieces. (In French.) J. Pomey, F. Goutel, and L. Abel. *Métaux: Corrosion-Industries,* v. 26, Sept. 1951, p. 347-356; Oct. 1951, p. 377-391.
Macroscopic strains due to anisothermic hardening were investigated. Part I reviews the problem. Part 2: Superficial measures deduced from Hertzian hardness with respect to preliminary strains, explored points, and corresponding Mohr circles; superficial strains after cementation and hardening; and application to carbonitrided surfaces. Part 3: Methods for determining strains inside sintered bodies. Part 4: Applications of the various methods.
(Q25)

133-Q. Results of Fatigue Tests Under Increasingly Heavy Loads. (In French.) Marcel Prot. *Revue de Métallurgie,* v. 48, Nov. 1951, p. 822-824.
Advantages of this technique. Data are charted for various steels, Al and Mg alloys. (Q7, ST, Al, Mg)

134-Q. Micrographic Study of the Temper Brittleness of Low Alloy Carbon Steel. (In French.) *Revue de Métallurgie,* v. 48, Nov. 1951, p. 825-852.
New information concerning micrographic technique and results and possibilities of its application to detecting temper brittleness and its causes. Micrographs and tables. 16 ref. (Q23, M21, AY)

135-Q. Study of the Temper Brittleness of Certain Steels by X-Ray Diffraction. (In French.) Adrienne R. Weill. *Revue de Metallurgie,* v. 48, Nov. 1951, p. 853-857.
Results of experiments using X-ray diffraction for distinguishing between a piece of steel in the tough state and the brittle state. Data are tabulated. (Q23, M22, ST)

136-Q. Application of the Microsclerometric Meyer Analysis to Temper Brittleness. (In French.) H. Bückle. *Revue de Métallurgie,* v. 48, Nov. 1951, p. 858-863.
Results of experiments of other investigators on above for low-alloy steels. Tables and graphs. 24 ref. (Q23, Q29, AY)

137-Q. Influence of Temperature on the Elastic Constants of Metals and Alloys. (In French.) Georges Vidal, Pierre Lescop, and Louis Raymondin. *Revue de Métallurgie,* v. 48, Nov. 1951, p. 864-874; disc., p. 874.
Brief discussion from the physical, metallographic, and mechanical points of view. Tables, diagrams, and graphs. 14 ref. (Q21)

138-Q. Study of the Internal Disorientation in Aluminum-Magnesium Alloy Single Crystals Subjected to Plastic Deformation. (In French.) J. Hérenguel and P. Lelong. *Revue de Métallurgie,* v. 48, Nov. 1951, p. 875-878.
Two methods are use of Lacombe's etching reagent and anodic oxidation of thin films of an Al+3% Mg alloy. Photomicrographs and diagrams. (Q24, M26, Al)

139-Q. Crystal Displacements in a Monocrystalline Sheet of Aluminum During Rolling. (In French.) Raymond Jacquesson and Jack Manenc. *Revue de Métallurgie,* v. 48, Nov. 1951, p. 883-887.
See abstract from *Comptes Rendus,* item 351-Q, 1951. (Q24, Al)

140-Q. Creep and Relaxation of Drawn Wires. (In French.) Robert de Strycker. *Revue de Métallurgie,* v. 48, 1951, p. 888-893, disc., p. 893.
Details of test procedure and influence of natural and artificial aging on relaxation properties. Data are tabulated and discussed for patented and drawn steel wire.
(Q3, ST)

141-Q. Influence of Surrounding Medium on Plastic Deformation of Metals. (In Italian.) Georges Masing. *Metallurgia Italiana,* v. 43, Nov. 1951, p. 467-470.
Conclusions of Rehbinder and coworkers are confirmed, except for effect on electrical resistance. Theoretical analysis of the observations.
(Q24, P15)

142-Q. Increase of Fatigue Strength of Welded Joints by Surface Peening. I. V. Kudriatsev and N. M. Savvina. (In Russian.) *Avtogennoe Delo,* v. 22, Apr. 1951, p. 8-12.
Cylindrical, plate, and channel-beam fatigue specimens were prepared by butt and lap arc welding and were given various stress relief and peening treatments. Data are tabulated and charted. 14 ref.
(Q7, G23, CN)

143-Q Dynamic Coefficient During Concentrated Loading. (In Russian.) V. N. Danilov. *Doklady Akademii Nauk SSSR,* new ser., v. 78, June 21, 1951, p. 1135-1136.
Dynamic coefficient is defined. Soft steel, red brass, Al, Pb, Sn, and a Sn-Pb alloy are included in the investigation. Data are charted.
(Q27, CN, Cu, Al, Pb, Sn)

144-Q. The Relationships of Properties in the Series of Metals Copper-Silver-Gold. (In Russian.) Sh. Ia. Korovskii. *Zhurnal Obshchei Khimii,* v. 21 (83), Mar. 1951, p. 429-432.
Regularities and variations of mechanical and physical properties of this series of metals. Data are tabulated.
(Q general, P general, Cu, Ag, Au)

145-Q. Directional Hardness Differences in Silicon Carbide Crystals. W. Stern. *Industrial Diamond Review,* new ser., v. 11, Nov. 1951, p. 237-239; Dec. 1951, p. 255.
Tests show that the grinding and polishing direction is a factor in the life and performance of various carbides. (Q29, G18, Si, C-n)

146-Q. New Hardness and Wear Testers. *Industrial Diamond Review,* new ser., v. 11, Dec. 1951, p. 261-263.
New apparatus for testing shear and scratch hardness, cutting resistance and machinability of metals.
(Q29, Q9)

147-Q. English Use Boron in Normalized and Drawn Heavy Sections. W. E. Bardgett. *Iron Age,* v. 169, Jan. 10, 1952, p. 81-84.
Evaluates the addition of boron to low-alloy and low-carbon steels. Effect on tensile and yield stress. Effect of Mo in varying amounts.
(Q27, AY)

148-Q. Ingot Mould Irons; Mechanical Properties. J. W. Grant. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 590-594; disc., p. 605.
Previously abstracted from *Journal of the Iron and Steel Institute.* See item 495-Q, 1951.
(Q general, CI)

149-Q. Poisson's Ratio; Variations in Cast Iron for Ingot Moulds. J. Woolman. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 594-596.
It is important to have some knowledge of Poisson's ratio so that an estimation of stresses induced in ingot molds will be as accurate as possible. Results are tabulated and discussed. (Q21, T5, CI)

150-Q. Ingot Moulds; Determination of Surface Stresses. M. W. Buttler and W. H. Glaisher. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 600-604; disc., p. 639-644.
Previously abstracted from the *Journal of the Iron and Steel Institute.* See item 498-Q, 1951. (Q25, CI)

151-Q. Iron and Fe-Mn Alloys; Tensile and Impact Properties. W. P. Ress, B. E. Hopkins, and H. R. Tipler. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 616-621.
Previously abstracted from *Journal of the Iron and Steel Institute.* See item 13-Q, 1952.
(Q23, Q27, Q6, Fe)

152-Q. Segregates; Physical and Mechanical Properties in Two Alloy Steels. H. M. Finniston and T. D. Fearnehough. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 621-626.
Previously abstracted from *Journal of the Iron and Steel Institute.* See item 680-Q, 1951.
(Q general, M27, AY)

153-Q. Experimental Survey of Low-Load Hardness Testing Instruments. A. R. G. Brown and E. Ineson. *Journal of the Iron and Steel Institute,* v. 169, Dec. 1951, p. 376-388.
Reviews the literature. The available low-load hardness testers, and method of operation used. Sources of error in hardness determinations. Results are tabulated. 48 ref. (Q29)

154-Q. Softening of Metals During Cold-Working. N. H. Polakowski. *Journal of the Iron and Steel Institute,* v. 169, Dec. 1951, p. 337-346.
A theory relating indentation hardness and energy stored in a cold worked metal is put forward as a tentative explanation of both the Bauschinger effect and work softening. To satisfy this theory, quenched and tempered steels should soften during the early stages of cold working, and they are shown experimentally to do so. This accounts for the low rate of work hardening during reversed and cross-rolling of sheets, reversed deep drawing, and during cold working and fatigue testing of heat treated steels. The softening effect provides an explanation of the recrystallization and mechanical properties of single and polycrystalline metals after reversed deformation. 48 ref.
(Q24, N5, Cu, Ni, Al, ST)

155-Q. The Creep of Metals and Creep-Resistant Alloys. A. H. Sully. *Murex Limited Review,* v. 1, No. 9, 1951, p. 211-228.
Analyzes creep in metals. Factors which influence creep, and compositions of creep resistant alloys. Utilization of creep test data as it affects engineering design. Structural phenomena and physical theory of creep. (Q3)

156-Q. An Improved Creep Measuring and Recording System. J. W. Huffman. *Product Engineering,* v. 23, Jan. 1952, p. 172-174.
Method developed by Engineering Research Laboratory, North American Aviation, Inc. (Q3)

157-Q. Dilastrain Method Speeds Research by Cutting Endurance Limit Test Time. *Product Engineering,* v. 23, Jan. 1952, p. 193.
Rapid and accurate method for determining the endurance limit of metals and plastics, used for moving mechanical parts such as turbine blades, aircraft propellors, drive shafts and the like, devised at Rensselaer Polytechnic Institute. This new development, called the R/S Dilastrain method, should speed the search for new alloys and materials by sharply reducing testing time.
(Q7)

158-Q. Wear From the Manufacturer's View-Point. G. A. P. Hunt.

Australasian Engineer, Nov. 7, 1951, p. 62-69.

The meaning of wear and how it can be measured. How wear is related to microstructure, to the pressure between the rubbing surfaces, and to casting cross-sectional area. Wear properties of various cast-iron structures. (Q9, CI)

159-Q. The Character of Spontaneous Initial Deformation. (In German.) Gotthold Müller and Werner Engelhardt. *Annalen der Physik,* v. 9, ser. 6, Oct. 15, 1951, p. 357-362.

Study of plastic deformation of Cu wire in the range of low shear stresses. Duration of spontaneous elongation is assumed to be functionally related to temperature. Data are graphed. (Q24, Cu)

160-Q. A New Aluminum Alloy of the Al-Cu-Si Type. (In German.) W. Thury and H. Landerl. *Berg und Hüttenmannische Monatshefte der Montanistischen Hochschule in Leoben,* v. 96, Oct. 1951, p. 201-205.

Study of strength properties and microstructure of eight Al alloys containing 1.32-2.43% Si and 1.47-2.39% Cu shows that they are suitable as cast alloys within certain limits and that their good properties and anodic oxidizability make them promising malleable alloys. Includes graphs, tables, and photomicrographs. 14 ref. (Q23, M27, Al)

161-Q. (Book) **The Hardness of Metals.** D. Tabor. Oxford University Press (Geoffrey Cumberleg), Amen House, Warwick Square, London E.C. 4, England.

Hardness measurements by spherical indenters, deformation and indentation of ideal plastic metals and of metals which work harden, the practical considerations of "shallowing" and elastic recovery, use of conical and pyramidal indenters, dynamic or rebound hardness, and area of contact between solids. Six appendices deal with Brinell, Meyer, and Vickers hardness measurements and their conversion factors, the connection between hardness and ultimate tensile strength, and typical hardness values. (Q29)

162-Q. (Book) **Theory of Perfectly Plastic Solids.** William Prager and Philip G. Hodge, Jr. 264 pages. 1951. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.

A general introduction. Basic concepts, trusses and beams, torsion of cylindrical or prismatic bars, general theory of plane strain and extremum principles. Treatment is mathematical. Chapter problems. (Q23)

R

CORROSION

34-R. Corrosion Resistance of Zirconium. Robert J. Bumbaugh. *Industrial and Engineering Chemistry,* v. 43, Dec. 1951, p. 2878-2880.

Results of an investigation to determine the effect of small amounts of O_2, N, C, and Hf. (R general, Zr)

35-R. Corrosion of Steel in Molten Sulfur. Andrew Dravnieks. *Industrial and Engineering Chemistry,* v. 43, Dec. 1951, p. 2897-2900.

Clarifies the fundamental mechanisms of sulfide formation on steel. Covers both the chemical and mechanical processes. Kinetic constants and film structure. (R6, ST)

36-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 43, Dec. 1951, p. 75A-76A, 78A.

Reviews a Russian report on the effect of acid concentration on the corrosion rate of carbon steels. (R5, CN)

37-R. H_2S and CO_2 Corrosion of Carbon Steel in Natural-Gas Processing Plants. D. E. McFaddin. *Oil and Gas Journal,* v. 50, Dec. 13, 1951, p. 97-98.

General conclusions derived from a study. (R9, CN)

38-R. Testing Wire Rope Lubricants. L. A. Bushell and P. Marais. *South African Mining and Engineering Journal,* v. 62, Oct. 20, 1951, p. 291, 293.

An investigation of corrosion and lubrication of wire ropes in Free State gold mines. Method of testing, apparatus, preliminary experiments, comparison of lubricants and results. (R7, Q9, ST)

39-R. Effect of Dilute Sulfuric Acid on Magnetized Iron. II. (In German.) G. Wagner. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften,* v. 82, Oct. 15, 1951, p. 774-784.

Results of a further study of "magnetolysis" in order to investigate the source of the oxygen evolved when magnetized iron is treated with H_2SO_4. 23 ref. (R5, P16, Fe)

40-R. Solution of Copper in Nitric Acid. II and III. (In German.) T. G. Owe Berg. *Zeitschrift für anorganische und allgemeine Chemie,* v. 266, Oct. 1951, p. 118-139.

Part II: Studies on the solubility rate of Cu in different concentrations of HNO_3 at temperatures ranging from -10 to $+30°$ C. Part III: Experiments were made with the specimen immersed in HNO_3 in different ways as well as without stirring the acid. 21 ref. (R5, Cu)

41-R. How Austenitic Nickel Cast Iron Can Serve as an Alternate for Caustic Manufacture. H. O. Teeple. *Chemical Engineering,* v. 58, Dec. 1951, p. 286.

Some mechanical properties and corrosion resistance of the Ni-Resists, a series of austenitic Ni cast irons. (R5, Q general, CI)

42-R. Aluminum Alloys for Handling and Storage of Fuming Nitric Acid. W. W. Binger. *Corrosion* (News Section), v. 8, Jan. 1952, p. 1.

Results of tests showing the resistance of Al to corrosion by HNO_3. (R6, T29, Al)

43-R. The Mechanism of Scale Formation on Iron at High Temperature. B. W. Dunnington, F. H. Beck, and M. G. Fontana. *Corrosion* (Technical Section), v. 8, Jan. 1952, p. 2-13.

Procedure and results of research. Proposes a new mechanism for high-temperature oxidation of Fe. Film formation. Photomicrographs of oxide scale on Armco iron. 18 ref. (R2, Fe)

44-R. Corrosion by Some Organic Acids and Related Compounds. H. O. Teeple. *Corrosion* (Technical Section), v. 8, Jan. 1952, p. 14-27; disc., p. 27-28.

Results of corrosion tests in various organic acids, principally those of the lower aliphatic series. Aqueous solutions of the acids and mixtures are considered. Related compounds, such as aldehydes, ketones, esters, and anhydrides. Materials of construction include the stainless steels, Cu, and Cu-base alloys, Ni and Ni-base alloys. (R5, SS, Cu, Ni)

45-R. Some Aspects of Ship Bottom Corrosion. Paul Ffield. *Corrosion* (Technical Section), v. 8, Jan. 1952, p. 29-48.

Pitting corrosion of carbon and low-alloy steels and its causes. Effects of stray currents, galvanic currents, mill scale, and Cu-bearing paint. Cathodic protection. 43 ref. (R4, CN, AY)

46-R. Performance Studies on Sulfur Jointing Compounds. Raymond B. Seymour, Walter Pascoe, W. J. Eney, A. C. Loewer, Robert H. Steiner, and R. D. Stout. *Journal, American Water Works Association,* v. 43, Dec. 1951, p. 1001-1014.

The problems of disintegration, stress and strain, and corrosion of cast iron pipe cemented joints made with sulfur compounds. Illustrations and graphs. 24 ref. (R general, Q25, CI)

47-R. Volatile Crystals Prevent Corrosion of Packaged Steel Parts. Philip O'Keefe, Jr. *Materials & Methods,* v. 34, Dec. 1951, p. 84-86.

A new method of preventing the corrosion of packaged steel articles by moisture. The vapor from the crystals condenses on the metal surfaces or dissolves in condensing moisture. The steel must be enclosed, although hermetic sealing is not necessary. Can be applied as a powder, dissolved in alcohol and sprayed into solution for metal dips, or used as a coating on wrapping papers. Properties, test results, and industrial applications. (R10, ST)

48-R. Progress in Corrosion Prevention. W. H. J. Vernon. *Metal Progress,* v. 60, Dec. 1951, p. 80-81.

Use of $NaCrO_4$, sodium benzoate, and $NaNO_2$ as corrosion inhibitors for steel and cast iron. (R10, ST, CI)

49-R. Oxidation in the Presence of Molybdenum Oxide. *Metal Progress,* v. 60, Dec. 1951, p. 158, 160, 162. (Condensed from "Rapid Oxidation of Metals and Alloys in the Presence of MoO_3," G. W. Rathenow and J. L. Meijering.)

Previously abstracted from *Metallurgia.* See item 411-R, 1950. (R2, Al, Cu, Ag)

50-R. The British Non-Ferrous Metals Research Association. G. L. Bailey. *Research,* v. 4, Dec. 1951, p. 569-572.

Reviews corrosion investigations carried on by the Association on galvanized steel and copper pipes. Includes brief discussion of researches on creep of metals. (R general, Q3, ST, Cu)

51-R. Relations Between Solution Potentials and Susceptibility of Stainless Steel to Selective Corrosion. L. R. Standifer, F. H. Beck, and M. G. Fontana. *Engineering Experiment Station* (Ohio State University), v. 23, Oct. 1951, p. 17-19, 47.

Pitting and intergranular corrosion. Experimental procedures and results. Diagrammed. (R2, SS)

52-R. Cause and Cure of Knife-Line Attack in Columbium Stabilized Steels. M. L. Holzworth, F. H. Beck, and M. G. Fontana. *Engineering Experiment Station* (Ohio State University), v. 23, Oct. 1951, p. 20-22, 47.

See abstract from *Corrosion* (Technical Section), item 13-R, 1952. (R2, SS)

53-R. Contribution to the Theory of Cathodic Protection. Carl Wagner. *Journal of the Electrochemical Society,* v. 99, Jan. 1952, p. 1-12.

Distribution of the electrical potential inside an electrolytic solution was calculated for typical cases of cathodic protection with the aid of an auxiliary metal. These calculations are used to work out equations and diagrams which permit prediction of the maximum extension of metallic surfaces for which cathodic protection can be accomplished. 16 ref. (R10)

54-R. Resistance of Titanium to Sulfuric and Hydrochloric Acids Inhibited by Ferric and Cupric Ions. Joseph R. Cobb and Herbert H. Uhlig. *Journal of the Electrochemical Society,* v. 99, Jan. 1952, p. 13-15.

Fe^{+++} and Cu^{++} ions are effective inhibitors for the corrosion of Ti in boiling 10% H_2SO_4 and boiling 10% HCl. Although the inhibitors are consumed as Ti corrodes, the consumption is moderate, particularly at the higher inhibitor concentrations corresponding to low corrosion rates. The primary mechanism, as indicated by potential measure-

ments, is believed to involve adsorption of Fe^{+++} or Cu^{++} on the metal surface with accompanying satisfaction of surface valences and formation of a dipole layer with negative charge outward accounting for a noble potential. (R10, Ti)

55-R. Metal-Solution Potentials of Nickel in Foreign Ion Solutions and the Mechanism of Nickel Corrosion. D. MacGillavry, J. H. Rosenbaum, and R. W. Swenson. *Journal of the Electrochemical Society,* v. 99, Jan. 1952, p. 22-27.

Phase-boundary potentials of Ni in various aqueous solutions, practically free from Ni ions, were measured. The Ni solution potentials in air may drift and reach high positive potentials. The potentials of Ni vs. solution in an inert gas reach stationary values after several hours, depending upon the pH. The final potentials remain negative with respect to the standard hydrogen electrode. The role played by O_2 in influencing the potentials has an interesting bearing on the initial stages of corrosion of Ni. 12 ref. (R1, Ni)

56-R. Modern Automotive Engine Oils. *Lubrication,* v. 38, Jan. 1952, p. 1-12.

Increasing use of addition agents in lubricating oils. Advantages in prevention of contaminants or deposit-forming materials from interfering with engine operation, preventing rusting of ferrous parts and preventing corrosive wear.
(R10, Q9, ST)

57-R. Cathodic Protection of Steel Underground. W. J. Schwerdtfeger and O. N. McDorman. *Technical News Bulletin* (National Bureau of Standards), v. 36, Jan. 1952, p. 1-2.

Previously abstracted from *Journal of Research of the National Bureau of Standards.* See item 380-R, 1951. (R10, ST)

58-R. Cathodic Protection of Tank Bottoms. *World Oil,* v. 134, Jan. 1952, p. 212-213.

Cathodic protection system is said to cost about 1½% of the replacement cost per year. Diagrams and illustrations show design of systems. (R10, ST)

59-R. The Rate of Solution and Solution Potentials of Iron. (In Russian.) Ia. V. Durdin and M. A. Oranskaia. *Zhurnal Obshchei Khimii,* v. 21 (83), Apr. 1951, p. 604-614.

Rate of solution and the solution potentials of Armco iron and commercial roofing iron in 10*N* HCl and H_2SO_4 were determined. Data are tabulated and charted. 11 ref. (R5, P13, Fe, CN)

S

INSPECTION AND CONTROL

35-S. Reference Radiographs for Inspection of Aluminum and Magnesium Castings. J. J. Pierce. *Machinery* (American), v. 58, Dec. 1951, p. 157-159.

How standard radiographic terminology to be used for defects in Al and Mg castings is to be illustrated in a manual prepared by the Naval Ordnance Laboratory. Test results on specimens containing defects and corresponding radiographs will be incorporated. (S13, Al, Mg)

36-S. Radiography as an Assistant to Foundry Practice. Charles B. Johnson and Stanley A. Brosky. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 151-156; disc., p. 157-158.

A survey. Various aspects of the procedure. (S13, E general)

37-S. Dimensional Checking and Pressure Testing of Gray Iron Castings. Kenneth M. Smith. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 304-308; disc. p. 308.

Previously abstracted from Preprint 14. See item 205-S, 1951.
(S14, CI)

38-S. Choosing Equipment for Nondestructive Testing. Carlton H. Hastings. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 309-314.

Previously abstracted from Preprint 15. See item 206-S, 1951. (S13)

39-S. "Spec" Sheets and Their Various Uses. John Taylor. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 372-375.

Use of specification sheets in the foundry for profitable operation. A specification sheet gives details of flash size, type of molding machine used or floor used, whether or not facing sand was used, etc.
(S22, E general)

40-S. Progress in Photographic Instrumentation in 1950. Kenneth Shaftan. *Journal of the Society of Motion Picture and Television Engineers,* v. 57, Nov. 1951, p. 443-468.

Includes high-speed still and motion photography, cathode-ray still oscillography, interferometry, radiography, photosensitive materials and treatment, optical sources, and various others. 299 ref.
(S13, S14, M23)

41-S. Interference Microscope for the Measurement of Surface Finish. M. Delaunay. *Microtecnic* (English Ed.), v. 5, Sept.-Oct. 1951, p. 248-250.

New type of microscope. (S15)

42-S. Comparative Results of Optical Measurements. (In French.) G. Ribaud, M. M. Michaud, M. M. Riviere, and M. J. Galey. *Chaleur & Industrie,* v. 32, Nov. 1951, p. 301-310.

Experiments on the measurement of temperatures of monocromatic brilliance of flames and of furnace refractories using a photoelectric cell. Effects of fuel type. Includes a comprehensive table of results. (S16)

43-S. "Complete Analysis" of Iron and Steel. (In German.) R. Kraus. *Fresenius' Zeitschrift für analytische Chemie,* v. 133, no. 6, 1951, p. 414-428.

Methods for analyzing pig iron, cast iron, malleable iron, unalloyed steel, and cast steel. 12 ref.
(S11, Fe, CI, ST)

44-S. Electronics at Work. John Starr. *American Machinist,* v. 95, Dec. 24, 1951, p. 102-104.

A brief survey of electronic methods in metalworking production jobs, including spot welders, riveters, induction heaters, machine-tool controls, etc. (S18)

45-S. A Steel Plate Thickness Meter. S. S. Carlisle and B. O. Smith. *Engineer,* v. 192, Dec. 21, 1951, p. 805-808.

A portable instrument for measurement by a magnetic method of the thickness of steel plates requiring access to one side of the plate only. The resistance, ultrasonic, and other magnetic methods of measuring the thickness of metal plates from one side only, and the advantages of the magnetic method adopted. Graphs and diagrams. (S14, ST)

46-S. Temperature Measurement and Control. Part II. (Concluded.) J. L. Garrison. *Industrial Heating,* v. 18, Dec. 1951, p. 2188, 2190.

Selection of correct automatic control system. (S16)

47-S. Steel Specifications. Norman E. Woldman. *Iron Age,* v. 169, Jan. 3, 1952, p. 260, 262, 266, 268, 270, 272, 276, 278, 280, 282-283, 286, 288, 290, 294, 296, 298-300, 302, 304-306, 308, 312, 314, 318, 320, 322, 324, 326, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 518, 520.

A brief analysis of various civilian, federal and military specifications designed to aid defense contractors. Lists the composition and form of the material referred to, and notes whether or not it is similar to a better known standard specification. (S22)

48-S. Estimation of Impurities in Aluminium Alloys by Means of Arc Spectra. J. Janiec. *Journal of Applied Chemistry,* v. 1, Nov. 1951, p. 482-488.

Spectroscopic method for the accurate estimation of Pb, Sn, Zn, and Ni in Al. Results are tabulated.
(S11, Al)

49-S. Flame Radiation Research Joint Committee: Reports of 1949 Trials at Ijmuiden. I. Introduction. J. J. Broeze, G. Ribaud, and O. A. Saunders. **Purpose and Plan of the Experiments.** J. E. de Graaf and M. W. Thring. **Review of Previous Work on Luminous Radiation.** F. M. Comerford. **Heat-Flow Meters.** R. T. Fowler, D. A. Richardson, and M. Riviere. **Total-radiation Pyrometers.** E. J. Burton, R. Mayorcas, M. Michaud, W. H. Pritchard, and M. Riviere. **Suction Pyrometry.** I. M. D. Halliday. **The Main Experiments.** R. Mayorcas. **Appendix. Control and Instrumentation of the Experimental Furnace.** G. W. Stein Callenfels. *Journal of the Institute of Fuel,* v. 24, Nov. 1951, p. S1-S16.

First part of a report on research into the phenomena of thermal radiation from flames, now being carried out at Ijmuiden, Holland, under the auspices of the Flame Radiation Research Joint Committee, by a team of British, Dutch, French, and Swedish engineers and scientists. 63 ref.
(S16)

50-S. High Quality Nonferrous Castings Assured by Use of Radiography. Charles B. Johnson and Stanley A. Brosky. *Materials & Methods,* v. 34, Dec. 1951, p. 73-75.

Use of radiographic inspection to decrease the percentage of rejects in castings. Reduces machining time and cuts material costs. (S13)

51-S. Ceramic Coating Increases Life of Engine Exhausts. Wilson G. Hubbell. *Metal Progress,* v. 60, Dec. 1951, p. 87-91, 166.

Service tests and thermal shock tests were made on the following materials: 19-9DL stainless steel with ceramic coatings on both interior and exterior; 19-9DL stainless steel with ceramic coatings on interior only; 19-9DL stainless steel, uncoated; 17-14 Cu-Mo steel, uncoated; modified Type 310, uncoated; Type 310 stainless steel with Cb, uncoated; Inconel X, uncoated; N-155, uncoated; and Hastelloy C, uncoated. Micrographs.
(S21, L27, SS, Ni, SG-h)

52-S. Internal Hydrostatic Pressure Testing as a Measure of Performance Values of Oil-Well Casing and Tubing. H. G. Texter. *Oil and Gas Journal,* v. 50, Jan. 7, 1952, p. 78-85.

Acceptable methods of determining whether any given lengths of casing or tubing are capable of withstanding the forces to which they will be subjected in oil well service. Arguments to show that high-internal-pressure testing is the most reliable and least expensive single method of checking performance values. Macrographs.
(S21, ST)

53-S. Notes on High Vacuum, High Temperature Technique in Induction Heating. G. W. Ziegler, Jr., L. E. Bollinger, R. Speiser, and H. L. Johnston. *Review of Scientific Instruments,* v. 22, Nov. 1951, p. 842-843.

Discussed from standpoint of thermocouple measurements and electron bombardment. (S16, M23)

54-S. New Methods and Devices for the Drawing Die Shop. W. Lueg. *Wire and Wire Products,* v. 26, Dec. 1951, p. 1146-1148.

Methods and equipment that have been found helpful in inspection of finished wire-drawing dies. Illustrations show tungsten carbide dies

in different conditions. Illustrations and diagrams show working scheme of the "Alfameter" and "Zetmeter" recently developed at the Max-Planck-Institut, Düsseldorf, Germany. (S13, S14, C-n)

55-S. Fluoroscopic Inspection of Light Alloy Castings. Thomas E. Piper and Justin G. Schneeman. *Machinery* (London), v. 79, Dec. 13, 1951, p. 1025-1029.

Differences between fluoroscopic and radiographic methods of inspection, as applied in shop practice. Results obtained with fluoroscopy and its many applications. (S13, Al, Mg)

56-S. Instrumentation in Iron and Steel Practice With Reference to Automatic Control. W. B. Wright and J. W. Muir. *West of Scotland Iron and Steel Institute Journal,* v. 57, 1949-50, p. 125-159; disc., p. 160-166.

Principles, application, and accuracy to be expected of a number of industrial instruments used in the production of iron and steel. Flow measurement, temperature measurement, CO_2 measurement, and application of automatic control. The various types of automatic-control action. (S16, S18)

57-S. Ultrasonic Detection of Internal Defects. (In French.) R. Pohlman. *Métaux: Corrosion-Industries,* v. 26, Oct. 1951, p. 410-414.

An ultrasonic process in which metallic pieces are placed in a vat filled with CCl_4, $CHCl_3$, or other liquid, making it possible to detect more accurately internal ruptures of thick plates. In one operation, an area up to 500 mm. diam. can be examined. The ultrasonic rays, produced by a quartz crystal or by an ultrasonic transmitter, completely traverse the examined piece and pass through a lens which focuses the rays. The lens is capable of producing, on an image-conversion plane, an exact sonic image of perturbations and defects. Diagrams and illustrations. (S13)

58-S. Spectrographic Analysis of Cast Irons. (In Italian.) Mario Scalise. *Metallurgia Italiana,* v. 43, Nov. 1951, p. 471-475.

Development of quantitative spectrographic procedure utilizing a medium-dispersion prism spectrograph. (S11, CI)

59-S. Spectrochemical Analysis of Lithium. Louis E. Owen and Janus Y. Ellenburg. *Analytical Chemistry,* v. 23, Dec. 1951, p. 1823-1825.

Corrosion studies involving molten Li metal and ferrous alloys made necessary the development of an analytical procedure for determination of metallic impurities. This technique has permitted quantitative study of corrosion rates not only of Li but also of other alkali metals and alkali metal hydroxides. (S11, R general, Li)

60-S. Radioactive Current Source. *Electronics,* v. 25, Jan. 1952, p. 212, 214.

Radioactivity can be used as a source of electric energy (at low levels) through the use of an "atomic battery" recently developed by the Ohmart Company of Cincinnati, Ohio. The conversion of radioactive energy to electrical energy is obtained by a cell made of two dissimilar materials separated by a filling gas. Uses in corrosion measurement, analysis of alloys, gas analysis and measurement of vacuum, pressure, and temperature. (S11, S16, S18, R11)

61-S. Photometric Determination of Copper in Iron and Steel with Diethyldithiocarbamate. John L. Hague, Eric D. Brown, and Harry A. Bright. *Journal of Research of the National Bureau of Standards,* v. 47, Nov. 1951, p. 380-384.

Procedure. Typical data are tabulated and charted. 13 ref. (S11, Fe, ST)

62-S. The Use of Optical Comparators in Tool and Cutter Grinding. C. W. Parnham. *Modern Machine Shop,* v. 24, Jan. 1952, p. 112-114, 116, 118, 120, 122.

An inspection machine capable of rapid and accurate checking of parts such as screws, gear teeth, tapers and other unusual shapes which are difficult to check by mechanical means. (S14)

63-S. Theoretical and Practical Sensitivity Limits in Fluoroscopy. D. T. O'Connor and D. Polansky. *Non-Destructive Testing,* v. 10, Fall 1951, p. 10-21.

Expressions are developed which describe the sensitivity or quality of fluoroscopic images in terms of measurable characteristics of X-Ray tubes and fluoroscopic screens. Experimental data are presented in support of these expressions. The requirements imposed by adequate fluoroscopic viewing are used to specify the design features of a proposed fluoroscopic X-Ray tube. A 4-fold improvement in fluoroscopic sensitivity in the inspection of Al and Mg alloys is demonstrated. 49 ref. (S13, Al, Mg)

64-S. Applications of the Triboelectric and the Thermoelectric Effects to the Sorting of Metals. Antony Doscheck. *Non-Destructive Testing,* v. 10, Fall 1951, p. 22-28.

Fundamental principles presented in elementary terms. Apparatus and procedure. An alloy of 90% Ni and 10% Cr has been found to be electrically "positive" to all of a very large number of various pure metals and alloys. Tribo-electric reactions with various types. (S10, P15)

65-S. Weldment Inspection in Aircraft Construction. John W. Sweet. *Non-Destructive Testing,* v. 10, Fall 1951, p. 34-38.

Methods used by Boeing Airplane Co., Seattle, for both steels and light alloys. (S general, ST, Al, Mg)

66-S. Railroad Maintenance Inspection. A. S. Pedrick. *Non-Destructive Testing,* v. 10, Fall 1951, p. 38-43.

An illustrated survey with special reference to practice in the Southern Pacific's shops. (S general)

67-S. Determination of Uranium in Ores. Review of Chemical Methods. F. T. Rabbitts. **Cellulose Column Method. Fluorophotometric Method.** J. B. Zimmerman. *Canadian Mining and Metallurgical Bulletin,* v. 45, Jan. 1952, p. 27-39; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 26-38.

Four chemical methods are outlined. The other two methods are described in more extensive detail. Diagrams, tables, graphs, and illustrations. (S11, U)

68-S. Emergency Specifications For Case-Hardening Steels. *Metallurgia,* v. 44, Dec. 1951, p. 311.

Details of eight new British specifications are summarized in a table. It is estimated that a 50% saving in Ni usage will be effected. (S22, Ni)

69-S. Immersion Pyrometry as an Aid to Smelting Practice; Results of Recent Research in the United Kingdom. *South African Mining and Engineering Journal,* v. 62, pt. 2, Dec. 8, 1951, p. 611, 613.

As applied to steelmaking. (S16, D general, ST)

70-S. Application of X-Ray Inspection in the Foundry. Part II. (In German.) *Metalen,* v. 6, Oct. 15, 1951, p. 359-365.

Reviews X-ray methods of determining the quality of castings. Diagrams and photographs. 20 ref. (S13, E general)

71-S. Quality Control and the Problem of Steel Selection From Commercial and High-Quality Steels. (In German.) Hubert Hoff. *Stahl und Eisen,* v. 71, Nov. 22, 1951, p. 1293-1304; disc., p. 1304-1310.

Quality control in an integrated steelworks, with examples of deep drawing and free-machining steels. Effects of type of melting or deoxidation applied, of pouring conditions, and of composition and degree of purity on workability and service performance. Charts and macrographs. 40 ref. (S12, ST)

72-S. Distortion and Failure of Steam Turbines and Their Prevention. (In German.) Ernst Pohl. *Stahl und Eisen,* v. 71, Dec. 6, 1951, p. 1375-1379.

Warpage of shafts and its elimination; cracks extending from the age hardened zone and the rim caused by prevention of expansion; and fatigue failure of moving blades caused by vibration, notches, and stress-corrosion. Methods of alleviation. Illustrations show various failed pieces. (S21, Q7, ST)

73-S. A Temperature Regulator for Electric Furnaces. (In German.) A. Simon and R. Schrader. *Zeitschrift für anorganische und allgemeine Chemie,* v. 266, Nov. 1951, p. 208-215.

The regulator is not affected by variations of barometric pressure and room temperature. It holds the temperature constant within ± 1° C. (S16)

74-S. Defective Castings and Their Causes. Part II. Non-Destructive Testing of Castings. (In Swedish.) L. Barrling. *Gjuteriet,* v. 41, Nov. 1951, p. 161-171.

A survey. Includes diagrams, photographs, X-ray pictures, and tables. 12 ref. (S13)

75-S. (Book) Materialprüfung nach dem magnetpulver-Verfahren. (Materials Testing by the Magnetic Powder Process.) E. A. W. Müller. 144 pages. 1951. Akademische Verlagsgesellschaft, Geest und Portig K.-G., Leipzig, Germany.

Principles, uses, and equipment of the various magnetic-powder methods of materials testing. Numerous illustrations, tabular data, graphs, a comprehensive bibliography, and a list of 52 German and foreign patents. (S13)

76-S. (Pamphlet). Rapid Identification of Some Metals and Alloys. 50 pages. Development and Research Div., International Nickel, 67 Wall St., New York 5, N. Y. Free.

Outlines and tables giving spot testing procedures for metals and alloys which can be used in the laboratory and the shop. The procedures are qualitative only. Directions for preparation of reagents. (S11)

77-S. (Book) Tables for Microscopic Identification of Ore Minerals. W. Uytenbogaardt. 242 pages. 1951. Princeton University Press, Princeton, N. J. $5.00.

Microscopic procedures. The minerals are arranged in the order of their increasing resistance to polishing and of their increasing reflectivity. Other properties considered are chemical composition, crystal system, Talmage hardness values, color, etching, and certain miscellaneous characteristics, such as twinning and cleaving. Reagents for etch tests. 441 ref. (S10)

T

APPLICATIONS OF METALS IN EQUIPMENT

39-T. Designing Dies for Postforming Thermosetting Laminates. William I. Beach. *Machinery* (American), v. 58, Dec. 1951, p. 171-177.

Design and construction of the dies. Application of wood, Masonite, phenolic resins, Kirksite, Al, brass, and cast iron as die material. (T5, Al, Cu, CI)

40-T. 14 Lobes Make a Big Sphere. *Chemical Engineering,* v. 58, Dec. 1951, p. 220.

Sphere is made of steel plates welded together and is used to store liquid methyl chloride at 150 psi. (T29, ST)

41-T. Ore Bridge Employs Manganese Steel. *Edgar Allen News,* v. 30, Dec. 1951, p. 5-6. (T26, AY)

42-T. Aluminum Foil Structural Core. T. P. Pajak. *Light Metal Age,* v. 9, Dec. 1951, p. 8-9, 37.

Uses, fabrication practices, and strength characteristics of structural sandwich material developed for aircraft. (T26, T24, Al)

43-T. Titanium in Aircraft Production. William S. Cockrell. *Light Metal Age,* v. 9, Dec. 1951, p. 10-12.

Results of an investigation of behavior of Ti in welding, forming, and heat treatment. High-temperature deterioration. (T24, K general, G general, J general, Ti)

44-T. Durability of Aluminium and Its Alloys—the Chemical Industries. *Light Metals,* v. 14, Oct. 1951, p. 541-546; Nov. 1951, p. 639-643; Dec. 1951, p. 662-667.

Last three parts of 5th and last article in a series dealing with the durability of Al in various spheres of application. Second part: Uses of Al in the textile industry. Last part: Various applications. (T29, Al)

45-T. Domed Roof at Norton Road School. *Light Metals,* v. 14, Dec. 1951, p. 657-658.

Use of pure Al in a roof. (T26, Al)

46-T. The Progress and Future of Structural Aluminium. C. Marsh. *Light Metals,* v. 14, Dec. 1951, p. 670-672.

A survey with the aim of freeing structural Al from steel concepts. (T26, Al)

47-T. Rolled Aluminum Bushings Low in Cost, High in Strength. *Materials & Methods,* v. 34, Dec. 1951, p. 174, 176.

Production steps, applications and features of aluminum bushings used in precision grinding wheels. (T7, G4, Al)

48-T. Forum on Technical Progress: Materials & Compounds. *Steel,* v. 130, Jan. 7, 1952, p. 241-242, 244, 246, 248, 251-252, 254, 257-258, 260, 262, 265, 268, 270, 272, 275, 278, 280, 282, 285.

Brief discussions by men from industry on the present situation and anticipations for 1952 regarding metal shortage, substitutes, and replacements. (T general)

49-T. The Use of Preferred Orientation Strip Steel in Turbine-Generator Stators. J. W. Apperson and C. B. Fontaine. *Transactions of the American Institute of Electrical Engineers,* v. 70, pt. 1, 1951, p. 836-839; disc., p. 839-840.

Specific application of oriented strip steel to turbine generators in the range of 1000-20,000 kw. Advantages of the oriented strip material over the former nonoriented materials. Test results on 16 generators using oriented strip. The material itself and a brief history of its development. (T25, P15, ST)

50-T. A New Proposal for Steel Filler Wire for Welding. H. Sekiguchi. *Welding Journal,* v. 30, Dec. 1951, p. 622s-624s.

Results of tests using steel wire containing adequate quantities of deoxidizers, such as Mn and Si, for filler wires for welding of mild steel. Data are graphed and tabulated. (T5, K1, K2, CN)

51-T. The Communications Wire Program of the Signal Corps. Howard F. Cleary. *Wire and Wire Products,* v. 26, Dec. 1951, p. 1141-1142, 1180.

Methods of procurement of communications wire and cable by the Signal Corps; the general existing requirements of the main classes of wire and cable; prospects of requirements in the immediate future of primary items. Research and development work. (T1, A4)

52-T. Steels for Woodworking Tools. J. Lomas. *Machinery Lloyd* (Overseas Ed.), v. 23, Dec. 8, 1951, p. 68-69, 71, 73, 75.

Various types of toolsteels for specific applications. Methods of heat treatment for attaining necessary properties. (T6, J general, TS)

53-T. Steels for Specialized Applications. J. M. Mowat. *West of Scotland Iron and Steel Institute Journal,* v. 57, 1949-50, p. 167-187; disc., p. 187-192.

Steels with distinctive properties. Chemical composition, methods of forging, heat treatment, and origin influence service efficiency. The latest developments in turbine rotors for high-temperature service where resistance to creep is of the utmost importance. Manufacture of forged steel rolls. (T25, T5, F22, Q general, AY)

54-T. Presidential Address. W. Barr. *West of Scotland Iron and Steel Institute Journal,* v. 57, 1949-50, p. 1-20.

Surveys results of metallurgical research for the development of new and better products. Structural mild steel, high-tensile structural steel, steels for high-temperature service, and stainless-clad steels. Failures, causes, and mechanical testing. (T general, Q general, SS, CN)

55-T. Three Laboratory Furnaces for High Temperatures. (In French.) R. L. Bickerdike. *Métaux: Corrosion—Industries,* v. 26, Oct. 1951, p. 415-421.

Arc, tungsten-resistance, and high-frequency induction furnaces designed for research on materials at high temperatures. Illustrations and diagrams. 24 ref. (T5)

56-T. Aluminum in Telecommunications Industry. (In French and German.) E. Glaus. *Aluminum Suisse,* Nov. 1951, p. 197-205. (T1, Al)

57-T. Diamond Substitutes. (In Russian.) M. E. Galkin and A. I. Gopp. *Stanki i Instrument,* v. 22, Mar. 1951, p. 16-18.

Metallic, abrasive, and hard-alloy substitutes for industrial diamonds. (T6, SG-j)

58-T. "Let's Decide To Like Aluminum". C. E. Bathe and Bryce Brady. *Electrical World,* v. 137, Jan. 14, 1952, p. 85-88.

Application of Al as a conductor material for urban distribution systems. Problems and how they were solved. (T1, Al)

59-T. Four-Wing Tipped Shanks Lower Flin Flon Drilling Costs. T. A. O'Hara. *Engineering and Mining Journal,* v. 153, Jan. 1952, p. 88-90.

Compares carbide-tipped shanks with threaded carbide bits and threaded shanks, on the basis of cost, drilling speed, and wear resistance. In view of performance tests, carbide-tipped shanks are being adopted for mine drilling. (T28, Q9, C-n)

60-T. Future of Minerals in Structural Products. John D. Sullivan. *Engineering Experiment Station News.* (Ohio State University), v. 23, Oct. 1951, p. 3-4, 27-29.

Ceramics and Al and Mg Alloys, Ti, and other structural materials, their role in national economy, application in jet planes, resistance to corrosion, the critical supply situation, and its alleviation through synthetics and ingenuity. (T26)

61-T. The Development of Air Expansion Turbines. E. Crewdson and P. E. F. Crewdson. *Industrial Chemist and Chemical Manufacturer,* v. 27, Dec. 1951, p. 551-553.

Results of experiments made with two types of air expansion turbines, inward flow reaction, and outward flow impulse. Comparative data. Materials of construction. Duralumin, bronze, and 18-8 stainless steel are all suitable. (T25, Al, Cu, SS)

62-T. (Book) Industrial Furnaces. v. 1. Ed. 4. W. Trinks. 526 pages. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $10.00.

General arrangement of subject matter has been retained with the exception that infrequently used material has been removed to the appendix. About 40% of the text has been rewritten and 94 new illustrations added. Calculations and tabular data have been brought up to date. Much new material has been added. Chapter headings are: Heating capacity; fuel economy; heat saving appliances; strength and durability, movement of gases; and appendices. (T5)

V

MATERIALS
General Coverage of Specific Materials

17-V. SAE Steel Committee Leads Alloys Conservation Program. *Iron Age,* v. 168, Dec. 27, 1951, p. 74-76.

Technical advances, and applications of boron steel as it is used to replace the critical Ni, Mo, and Cr alloys. (T general, AY)

18-V. Properties and Application of Ductile Iron. G. L. Cox. *Iron and Steel Engineer,* v. 28, Dec. 1951, p. 75-83; disc., p. 83-84.

Chemical composition, mechanical properties, heat treatment effects, and resistance to corrosion. 12 ref. (Q general, J23, R general, CI)

19-V. Something New In Carbides. *Screw Machine Engineering,* v. 13, Dec. 1951, p. 38-40.

Mechanical and physical properties of a new series of chromium carbides developed by Carboloy Dept. General Electric Co. Applications to bearings, welding rods for deposition of carbide surface coatings, and to precison gages. Miscellaneous properties are summarized. (Q general, T general, Cr, Q, C-n)

20-V. Zirconium—An Old New Metal. Harold J. Read. *Mineral Industries,* v. 21, Dec. 1951, p. 3, 6.

Difficulty in extracting Zr from the ore, methods of refining, adverse effect of impurities, applications, uses, and advantages over Ti and other metals. (Zr)

21-V. Cast Alloy Reference Sheet. N. S. Mott. *Chemical Engineering Progress* (Engineering Section), v. 47, Dec. 1951, p. 654.

Miscellaneous properties of low-carbon 25% Cr, 12% Ni steel. Emphasis is on corrosion resistance—qualitative resistance to a large number of common chemicals and industrial materials. (R general, SS)

22-V. New Chromium Carbides Have High Temperature and High Corrosion Resistance. *Materials & Methods,* v. 34, Dec. 1951, p. 69.

Important features and experimental applications. (Cr, C-n)

23-V. Titanium, Zirconium, Molybdenum, Tungsten, Tantalum, Columbium, Vanadium, Hafnium as Engineering Materials. John L. Everhart. *Materials & Methods,* v. 34, Dec. 1951, p. 89-104.

A series of comprehensive articles on engineering properties, forming and machining characteristics, weldability, cleaning and finishing characteristics, and present and potential uses. Tabulated and illustrated data. (Ti, Zr, Mo, W, Ta, Cb, V, Hf)

24-V. Pure Vanadium: A Promising Engineering Material. *Steel*, v. 129, Dec. 31, 1951, p. 52-55.

Fabricating, mechanical, and physical characteristics. The metal also has high salt-water corrosion resistance and negligible magnetic susceptibility. Stress-strain diagrams for the pure metal. (V)

25-V. Less Familiar Metals of Commercial Importance. Robert A. Lubker. *Mechanical Engineering*, v. 74, Jan. 1952, p. 3-8, 18.

Availability, production processes, properties, alloys, cost, and uses of 20 metals which are relatively uncommon but of appreciable or potential industrial importance. (EG-a)

26-V. Man of the Year: Young Mister Magnesium. F. L. Church. *Modern Metals*, v. 7, Dec. 1951, p. 24-25, 27-28, 30-32, 34, 36.

Progress of the Mg industry to date. Fabrication of a Mg carrying case. Practices of the die-casting department. (A4, E13, Mg)

27-V. Materials for High-Temperature Use. Clyde Williams. *Monthly Business Review*, v. 34, Jan. 1952, p. 16.

Recent developments in metals, alloys, ceramics, and their combinations. (SG-h)

28-V. Molybdenum: Our Most Promising Refractory Metal. J. J. Harwood. *Product Engineering*, v. 23, Jan. 1952, p. 121-132.

Properties and applications. Includes sections on mining and production methods, physical and mechanical properties, high-temperature properties, oxidation and corrosion, fabrication and processing, welding, alloy compositions, and applications. 14 ref. (Mo, SG-h)

29-V. Boron Steels Supplement Scarce Nickel, Moly Alloys. Donald H. Ruhnke. *Steel*, v. 130, Jan. 14, 1952, p. 66, 69-70, 72, 75.

Present status of boron steels. Results to date on hardenability, mechanical properties and users' reaction to these steels. (Q general, J26, AY)

30-V. Precipitation-Hardening Stainless Cuts Hand Work and Rejects on Aircraft Parts. F. Robert Kostock. *Western Metals*, v. 9, Dec. 1951, p. 32-34.

A new Cr-Ni stainless steel produced by Armco Steel Corp. Can be heat treated at relatively low temperatures to high strength and hardness. Pickling practices, welding techniques and typical applications of this new alloy. (SS)

31-V. Magnesium and Its Alloys in 1951. R. G. Wilkinson. *Metallurgia*, v. 44, Dec. 1951, p. 299-302.

Present status of Mg. Recently developed alloys with improved mechanical properties which find increasing application in many spheres. Casting and wrought alloys, and argon-arc welded Mg alloy tubing. (Mg)

32-V. Copper and Copper Alloys. 5. Manganese Bronze Alloyed With Nickel. (In Dutch.) *Metalen*, v. 6, Sept. 15, 1951, p. 328-329; Oct. 15, 1951, p. 366-368; Nov. 15, 1951, p. 404-405.

Includes tabulated data on chemical compositions and properties. Part 6 (Nov. 15 issue) deals with refining of native, blister, and "black" copper from various sources. (To be continued.) (C21, Cu)

33-V. (Book) Cutting-Tool Materials. Eric N. Simons. 180 pages. Sir Isaac Pitman & Sons, Ltd., 39 Parker St., Kingsway, London, England. 21s.

Each group of alloys is treated systematically, with detailed information on compositions, characteristics, applications, forging, and heat treatment, including types of furnace. Two chapters cover grinding the tools, and testing and inspection of toolsteels. Appendices on compositions, designs, etc. (SG-j, TS, C-n)

34-V. (Book) Gmelins Handbuch der anorganischen Chemie. System-Nummer 68, Teil A. Lieferung 5 und 6. Platinum. (Gmelin's Handbook of Inorganic Chemistry. System No. 68, Part A, Sections 5 and 6. Platinum.) Ed. 8. 321 pages, (p. 533-854). 1951. Verlag Chemie G.m.b.H., Hauptstrasse 127, Weinheim Bergstrasse, Germany. 79DM.

Comprehensive reference volume to the world's literature on Pt, particularly its alloy systems. The section on history and location of deposits covers literature to the end of 1937; the section on recovery and preparation of platinum metals, their applications, special forms, and colloidal solutions covers literature to June 1939; the section on analytical methods covers literature to Jan. 1940; and the sections on alloys of Pt cover literature to June 1948 (some to the end of 1949). (EG-c, Pt)

35-V. (Book) Steels in Modern Industry. W. E. Benbow. 562 pages. Iliffe & Sons, Ltd., Dorset House, Stamford St., London S.E.1, England. $5.88.

Uses and properties of modern steels, keyed to the needs of designers and engineers. An introductory section briefly discusses basic metallurgy. Twenty-nine specialists have contributed to the 25 sections, each of which tells the properties of various steels, their treatments, and their applications. (ST)

EMPLOYMENT SERVICE BUREAU

The Employment Service Bureau is operated as a service to members of the American Society for Metals and no charge is made for advertising insertions. The "Positions Wanted" column, however, is restricted to members in good standing of the A.S.M. Ads are limited to 50 words and only one insertion of any one ad. Address answers care of A.S.M., 7301 Euclid Ave., Cleveland 3, O., unless otherwise stated.

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METALLURGIST: Recent graduate with interest in welding to work in metallurgical laboratory. CHEMIST: Recent graduate or experienced nongraduate to work in quantitative spectrography in metallurgical laboratory. These and other openings in technical fields are available at new plant being established by prominent automotive concern near Philadelphia. Box 2-5.

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RESEARCH SUPERVISOR: Excellent opportunity for experienced metallurgist to organize and direct important program in general application and physical metallurgy. Graduate study in this and/or equivalent experience desired. Applicant should possess interest and knowledge of modern research methods in addition to practical background. Salary commensurate with qualifications. Box 2-20.

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JUNIOR RESEARCH METALLURGIST: With M.S. degree and two/three years experience. Work involves studies in applied metallurgical research in automotive field. Either ferrous or nonferrous specialty acceptable. Excellent opportunity for experience and advancement. Box 2-35.

SALES TRAINEES: Two recent business administration or engineering graduates, preferably metallurgical, for approximately one year inside sales training prior to territory assignment, Chicago area. Send brief resume including education, work history and draft status to: Sales Dept., Bliss & Laughlin, Inc., 155th St., Harvey, Ill.

HIGH-TEMPERATURE METALLURGIST: Excellent opening for metallurgical engineer with interest in and knowledge of modern research methods in the field of high-temperature alloys. Experience with creep and stress rupture testing preferred. Opportunity for advancement in expanding organization. Write: Metals Dept., Armour Research Foundation, Chicago 16.

PHYSICAL METALLURGIST: Experienced Ph.D. or equivalent, interested in wide variety petroleum metallurgical problems. Leading Midwest research organization. Box 2-100.

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METALLURGIST: Airframe manufacturer in Southern California desires experienced aluminum metallurgist for production laboratory. Fundamentals of aluminum metallurgy required for trouble shooting and development of aluminum fabrication. Salary commensurate with ability and experience. Reply giving age, education and experience. Box 2-40.

SALESMAN — TOOLSTEEL: For reputable toolsteel company establishing new warehouse in Los Angeles. Excellent opportunity for qualified person. Experience and knowledge of heat treatment and metallurgy of toolsteels desirable. Essential to have good contacts in territory. Give complete information regarding age, education, experience, service status. Box 2-45.

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PHYSICAL METALLURGIST, SOLID STATE PHYSICIST, PHYSICAL CHEMIST: Unusual opportunities for fundamental physicometallurgical research in exceptionally well-equipped laboratory. Publication of work encouraged. Salary commensurate with training and experience. Attractive location, pleasant climate. Box 2-50.

METALLURGICAL, MECHANICAL, CHEMICAL ENGINEERS: Technical and Production Division, Savannah River Operations Office, U. S. Atomic Energy Commission, has a few critical key vacancies on its staff for highly qualified engineers; salaries ranging from $5940 to $9600 depending upon qualifications. Candidates should have past experience in atomic energy work, or academic background at postgraduate level with demonstrated aptitude for or interest in nuclear science, or significant industrial experience of a nature readily adaptable to atomic energy field. Additional information on specific positions upon request. Box 2-55.

POSITIONS WANTED

EXECUTIVE ENGINEER: Age 41. Diversified experience in engineering and manufacturing of refrigerators, freezers, washers, ironers, other appliances. Detailed experience in production and plant engineering, production control, product design and development, factory cost, purchasing, personnel and sales engineering. Former positions as works manager, chief engineer, chief production engineer. Present salary, five figures. Box 2-60.

SALES ENGINEER: Graduate registered professional metallurgical engineer with strong persuasive and social interests desires position in sales. Age 31, married. Seven years physical ferrous metallurgical experience in production and research. Thoroughly familiar with application and processing of carbon and alloy steel. Box 2-65.

METALLURGIST: Age 24, single. Degree. Will be released from Army September 1952. Holds responsible assignment as assistant editor of Army newsletter receiving world-wide distribution. Interested in production training program in nonferrous field. No location preference. Box 2-70.

METALLURGICAL ENGINEER: Age 29, married, veteran, no reserve status. Four years diversified experience in laboratory development work and process control problems with jet engine manufacturer. Desires position in development and factory control work with advancement opportunities. Prefers eastern location. Box 2-75.

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MANAGER OF HARD METALS PLANT: Estonian refugee now in Austria desires contacts in U. S. or Canada with company or research institution interested in worker of broad educational and industrial experience. Age 40, married, two children. Engineering degree, speaks English, German and Russian. Two years in cement plant, research; one year teaching physical chemistry; four years as research engineer. Presently employed as member of research staff and manager of quality and control in permanent magnet department, in charge of hard metals and precision casting plants. Write directly to: Dr. Ing. Victor Berg, Kapfenberg/Austria, Mariazellerstr. 73.

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A Metallurgist or Metallurgical Engineer to work on Chemical Plant corrosion. He will be in charge of a Metallurgical and Photographic Laboratory and will be responsible for corrosion and material testing and for specifications for new constructions and processes. Experience desired but not necessary. Salary commensurate with training and experience. Contact Personnel Department, Celanese Corporation of America,

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